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FOSSILS AND FOSSILIZATION.

BY L. P. GRATACAP.

IV.

(*Continued from p. 33.*)

As regards their degree of preservation the nature of the deposit has some influence upon the condition of fossils; and the nature of a deposit involves also a suggestion of its position, as we have seen, whether subject to estuarine vicissitudes, tidal fluctuations, or the ceaseless attrition of shore waves. When we examine the sandy and gravelly deposits of the Potsdam (Cambrian), the Medina (Upper Silurian), the Chemung and the Catskill (Devonian), the coarse conglomerate of the Lower Carboniferous, or the calcareous grits of the Schoharie and Oriskany (Lower Devonian) we find a reflexion of their physical character in the condition of the fossils preserved in them. The trilobite layers of Wisconsin and Minnesota in the Upper Cambrian (Potsdam) are crowded with the separated parts of these crustacea, whose delicate articulations were unable to resist the friction they were exposed to in the motions on a beach of siliceous sand. Neither does a sandy beach receive impressions with ease and certainty, as the indistinct outlines of the trilobites in these beds show. Furthermore, in a siliceous bed, more or less percolated through by water, the water has dis-

solved the calcitic or lime parts of these animals, since they were not protected against this depletion by the presence of a calcareous matrix, unless, as with *Obolella polita*, at Trempeleau, Wisconsin, the great numbers of the fossil itself acts as a protection against solution and attrition. The influence of a slight admixture of a plastic ingredient in improving the casts and impressions of fossils is seen in the more argillaceous layers of the Cambrian beds, as at Mazomania, Wisconsin, where *Aglaspis barrandii* and *Dicellocephalus minnesotensis* are retained with a firmer and more legible outline. In many layers the Obolellas are broken, and appear as shelly fragments scattered over the rock. The Obolella is also a compact and small object, protected to some extent by the convexity of its valves; but where it is preserved in perfection we may reasonably conclude, like the little *Gemma gemma* of our coasts, it had buried itself in the sand, and was not expelled from its safe position by waves or denudation. The regular close distribution of these fossils over the slabs of Potsdam sandstone show that they suffered little or no displacement. On the other hand, the fragments of Ptychoparia (trilobite) in the same rocks at Trempeleau, Kickapoo, prove from their heterogeneous, confused interference of parts, some drifting, rubbing and dislocation. The *Lingulepis pinniformis*, a delicate shell, and with valves held together by ligaments alone, occurs in great numbers in the sandy Potsdam beds of St. Croix, and in a very good state of preservation; in some instances, the concentric lines of growth, the polished and corneous surface being retained. But, for the most part, the individual shells have suffered from friction and breaking. *Lingulella stoneana* in the red beds of Mazomania are flattened and disfigured. But in the green slates of Braintree, Mass., *Paradoxides harlanii*, a trilobite, is well preserved, except where distortion from compression and lateral motion has strained and deformed the parts. Similarly another crustacean, *Olenellus*, in the less dense slates of Georgia, Vt., also Lower Cambrian, is found quite well preserved, but suffering mutilation and almost obliteration at times, from the metamorphic pressure by which these aluminous muds were transformed into fissile shales. In the annelid, green paper shales of Waterville,

Kennebec River, Maine, the serpentine markings of what has been referred to a worm are well preserved. In the Medina sandstone, a red ferruginous sandstone of the Upper Silurian age, the fossils are poorly preserved, lacking fullness of contour and seldom showing the surface characters with any distinctness. Lyell collected oyster shells and Buccinum thrown up by a storm on the shore of the estuary of the Forth, Scotland, and observed that "although still living, their shells were worn by the long attrition of sand which had passed over them, as they lay in their native bed, and which had evidently not resulted from the mere action of the tempest, by which they were cast ashore." The fossils of the Medina sandstone show abrasion, and in most cases present a rude cast of sand, made by the filling in of the shell, without muscular markings, and often with shrunken outlines, as if the sand filling had contracted. Wet sand, occupying the interior of a shell, must, upon drying, undergo some contraction, and being less apt to contract equally than clay or a calcareous paste, reproduces its mould less perfectly. The finer grained sandstone, however, and those somewhat more coherent, from the intermixture of lime or clay, are better adapted for the retention of fossil bodies and impressions. Thus, the Chemung sandstone (Upper Devonian) is a variable mixture of sand and carbonate of lime, and is introduced in a series of shales and siliceous limestones, whereby, as it formed a contiguous beach deposit to these, it became a repository of fossils, and was from its constitution better adapted to retain them. Mosely observed in the beach of Little Saba Island that there was being formed a reddish sandstone conglomerate rock, made up of the débris of the rock of the higher parts of the island cemented together by calcareous matter, derived from the corals and calcareous sand. And in this forming mass, which made a hard compact rock, there were embedded "plenty of the various corals from the beach, and large Turbo shells (*T. pica*) with their nacre quite fresh in lustre, and their bright greenish color unimpaired." Something similar is seen in the Chemung flagstones, and in the fossiliferous layers of this group of beds the organic remains are plentiful and well preserved. In the Catskill sandstones, which

vary greatly in their texture, but generally are coarse and irregular in grain, we find the evidence of unfavorable conditions for fossil remains in the comminuted fish bones and scales, except where massiveness precludes such dislocation and fracture, as with the shoulder plates of large Antiarcha (*Bothriolepis taylorii*).

The fresh water bivalve, *Amnigenia catskillensis*, is found in the Chemung beds, in the shaly stratum known as the Oneonta sandstone, at Mt. Upton, Chenango Co., N. Y., and in the Catskill beds higher up, where it is embedded in sandstone. The state of fossilization in these two different positions is somewhat contrasted. The shells of this species in the magnesian slate, which has been a softer and less injurious matrix than the sandy layers of the Catskill girt, are well preserved, indicating a thinner and less corrugated shell than its representatives in the sandstone. The shell has here been kept entire, as in a replacement wherein we have the pseudomorph of the two valves in juxtaposition, the waving and somewhat confluent lines of growth conspicuous, and the thin, fragile expanded margin preserved, whereas in the sandstone the impressions of the surface are less clear and distinct, and the shell-body cannot be removed by itself, as in the type specimen from these softer and less sandy beds.

Fossils are well preserved in the slates, which, from their fine texture and mechanical homogeneity, take impressions easily. But in this group of deposits pressure has acted unfavorably in many instances, and the fossils have suffered distortion and compression. Many of our fossiliferous slates, as the Utica, Marcellus and Genessee, are dark-colored from carbonaceous admixtures, and the fossils in them partake of their color, which, in a measure, destroys their perfection and usefulness. Again, pyrite in many instances has been precipitated by organic reduction over the surfaces of fossils in these beds, and the fossils then appear coated or replaced by this yellow sulphide, by which they are made conspicuous upon a black background. The interesting sponges of the Utica Slate are by this means beautifully retained as a network of metallic threads and fronds, reticulating meshes of pale gold (*Cyathophycus subsphericus* and *C. reticulata*).

The limestone formations which represent the accreted deposits of foraminiferous ooze, shells, and the lime paste made by the solution of shells, contain fossils in great abundance, and yield excellent specimens. But specimens in individual perfection, such as are extracted full and free from their matrix, are mainly obtained from impure limestone rocks. The admixture of clay or sand differentiates as it were the matrix from its included fossils, and they seem less consolidated and blended with the surrounding rock, so that their outlines form boundaries of separation, and the fossils are picked out complete, quite disengaged from any adhering stone. Such beds as the Hudson River Slates, the Waldron beds of Indiana, the Hamilton layers in New York, the Lower Carboniferous shale at Crawfordsville, Indiana, are illustrations of a fossiliferous rock from which the fossils become detached, retaining their surface characters and a clean, hardened epidermis, from which every particle of rock can be separated. In siliceous limestones, like the Schoharie Grit, the Oriskany Sandstone, and the Calciferous beds along Lake Champlain, the fossils are revealed by weathering, whereby the limestone seems displaced by solution in surface waters, or slowly lifted from the contour of fossils by frost decrepitation, and the fossils remain as partial or entirely siliceous reliefs. Prof. Perkins, of Vermont, has found productive quarries of fossils under growing trees, where the vegetable acids have disintegrated the calcareous portions of these beds, and left the silicified fossils in complete relief or entirely free, as if shaken out from the enclosing envelopes of rock. In hard limestones this surface weathering often takes place, a sort of aerial development, by which the valves of shells, the spines and members of trilobites, the stems and plates of crinoids, slowly emerge and stand out on a rock, whose interior faces only reveal a poorly discerned outline of fossils, until they have undergone this atmospheric alteration. The fossils themselves appear to have resisted the attack of acid waters and frost from having a greater density, upon which these agents of change failed to act, or from having become silicified in the process of change. In many of these beds the fossils are colored by iron oxide, caused by weathering, from a protoxide to

a sesquioxide, and so the contained remains of animals are changed from a blueish gray to a ferruginous yellow, and become more conspicuous. Fossil shells possessing a smooth, compact surface seem to have often escaped disintegration, while the surrounding matrix was removed, because they afforded no absorptive surfaces for the retention of the dissolving infiltrations of acid waters. It must also be borne in mind that the changes which limestone beds undergo from secondary crystallization, produced by the geognostic conditions of pressure, heating, etc., affect all their contents, and develop a crystalline structure in which the fossils become scarcely recognizable.

Invertebrate fossils occur as moulds, casts, or entire shells and bodies, according as they have left their impressions in the soft sediments amidst which they lay, or have been filled by the penetration of the ocean mud, so as to have produced a complete cast of their entire interior shape and markings; or, lastly, as they have been petrified throughout, and remain as they were deposited, retaining their exterior shell or integuments, and presenting when extracted a stone counterfeit of the original organism. Of course, for the most part, in such a process of petrifaction all interior structure is destroyed. But this is not universally the case, and many important interior appendages are sometimes preserved in exquisite perfection, or, at least, so far preserved as to afford instruction to the palæontologist. This preservation is determined by the nature and substance of these parts, and depends also upon the mineral conditions existing during the fossilization of the animal. Thus, the brachial appendages of *Orthis*, *Strophomena* and *Productus* are of such a soft and fleshy texture as to be unable to resist change long enough for their conversion into a mineral framework, although their impressions are found, whereas with *Spirifera*, *Terebratula* and *Atrypa* these delicate spirals and loops, upon which the breathing arms are supported in the chamber cavity of the shell, are preserved in a siliceous reproduction. Again, a sandy deposit will seldom permit the perfect preservation of fragile portions of the animal, nor induce that gradual replacement of its calcareous structure by

silica, such as has evidently taken place in the corals of the Upper Helderberg limestone. An exception occurs in the Brachiopoda of the very sandy loosely coherent beds of the Oriskany sandstone at Cumberland, Maryland. In pocket-like cavites at this locality in the sandstone the molluscan remains are found beautifully preserved in silica, doubtless owing to the supersaturation of infiltrating waters with colloidal silica. The muscular bundles, the vascular markings of the circulating system, the punctate surface of the mantle in mollusca are, however, well retained in siliceous muds or sandy limestones, and surpass in usefulness similar indications in limestones, where incipient crystallization has destroyed these by knitting both shell and its contents into a crystalline unit.

Fossils are frequently removed by solution in carbonated waters, and possibly in waters carrying organic acids, as suggested by Dr. Julien, when "in porous masses of gravel, sand and clay" they become subject to saturation in such menstrua. Hilgard has shown the protective influence of an argillaceous matrix, for in the Tertiary deposits of the Southern States the shells were only partially destroyed in the clay layers, while calcareous concretions, made by the liberated lime from the dissolved fossils, were frequently in the more porous portions of the deposit. In the Palæzoic sandstones generally shells are less common than the impressions, moulds and casts, and a similar process of obliteration may have removed them also.

The replacement of invertebrate fossils by mineral pseudomorphs or substitution is a very interesting and important subject, and remains yet a peculiar method in the economy of nature. While it is true that silicification, or the replacement of organic structure by silica, is the most common and the most satisfactory form of this change, yet a number of other mineral species become transferred in organic bodies to the places occupied by the molecules of organic tissues, or of the carbonate of lime shells. In the Lower Silurian beds of the Galena limestone, in Wisconsin, fossils assume the substance of sulphide of lead (Galenite); and in Cornwall fragments of antlers, containing tin oxide, are found, wherein "the original structure seems to be almost entirely reproduced as cassiterite" (Phillips).

In the Coal Measures the fossil mollusca (*Solenomya, Macrocheilus Orthoceras Bellerophon*) are often found as earthy casts coated with a skin or shell of iron pyrite. Limonite, the hydrated sesquioxide of iron, reproduces the shells of *Atrypa, Beyrichia, Dalmania,* in the Clinton iron of the Upper Silurian, in Oneida Co., N. Y., while Malachite, Sphalerite, Sulphur, Barite, Celestite, Fluorite, Calamine, etc., in an imperfect way replace the shells or coverings of fossils, fill their interiors, and rarely take on the resemblance of their tissue and texture.

The silicification of fossils in its simplest expression is the substitution of the mineral quartz—silica—for the molecules of the shell of an organism, or for those of its hard or horny anatomy. The exact steps by which this alteration is effected are not clearly known, and of the many hypotheses offered to explain this phenomenon all may have some elements of truth. It was observed long ago by Von Buch that this silicification followed the organic structure.

It is certainly true that organic matter, if of some consistency, possesses some power of arresting silica, fixing it, as it were, by removing it from aqueous solutions. Le Conte suggests that at least in the case of wood an alkaline silicate in water is neutralized by the humic acid of the decomposing vegetation, by which the silica of the salt is precipitated in the pores of the wood, and the wood fibre, as humic acid, is removed as the silica assumes its position. This seems to imply too much incipient decomposition to be reconciled with the very perfect microscopic manner in which wood texture is replaced by an agate pseudomorph. Dr. Julien has laid great stress upon the important silicic compounds of vegetable or organic acids in producing colloidal silica replacements. This view seems to be that "during the decomposition of the sarcode of both animal and vegetable organisms, after death, gelatinous or colloid substances are generated, resembling *glairine*, which are soluble in sea water, which combine with silica, and may therefore convey and concentrate it, dissolving its particles disseminated through submarine sediments, and which may, in forms produced by gradual oxidation, act also as acid solvents of lime, oxides of iron and manganese." A similar explanation, though

somewhat more simple, is, that in siliceous rocks, or in positions where calcareous fossils are exposed to siliceous waters, the terrestrial waters carrying silica, which may have entered into solution through its union with organic bodies, dissolve these fossils by their contained carbonic anhydride, and this assumption of a new burden diminishes their carrying power of other dissolved contents, and these latter are dropped at the exact moment the new solution is effected. Or, as carbonate of lime is taken up in solution silica is deposited. In the phenomenon of solutions and solvents this equilibrium of dissolved contents perhaps is not clearly proven, but seems in some cases probable.

(*To be Continued.*)

BIRD LIFE IN CENTRAL AMERICA.

By Daniel F. Randolph.

A short time ago a friend of the writer was in Central America for the purpose of studying the country and its peculiar people. Ornithology is a hobby of his. Upon his return, I induced him to give me an account of his trip, which he did. The following is a transcript of my shorthand notes of his talk.

"I remember," he began, "that about the shores of the lagoon where I spent considerable time, there were great numbers of a handsome rail, which was very delicate eating, the flesh being milk white. It has a habit of skulking under the reeds and bushes on the shores during the day, and sometimes, when congregated in marshy places, makes a great noise by chattering in chorus. When shot, this bird goes through more contortions than any other bird I know of, not running away when wounded, but invariably tumbling on the ground, kicking and fluttering about in the most violent manner.

"A large red-breasted kingfisher is very common in all the lagoons and the lower part of the rivers; and blue and white garlings are seen on nearly all the shoals and creeks.

"I went along the sea-beach (by a little lagoon), among the

mangroves, and secured three bittern and a few other water-birds. Some large snipe were to be seen there, active little sandpipers ran in great numbers along the hot sands, which enclosed the lagoon. I recall shooting in the savannahs a curious little goat-sucker; and I saw there a great tree covered with the large hanging nests of the yellow-tail. I also shot a species of night-heron, which the natives call "the carpenter:" it is one of the few birds they take the trouble to shoot for eating. All around the shores were large flocks of active fly-catchers, called the "wees bird," and a small falcon is often seen perched on the tall pine trees, or winging its rapid flight across the savannah in chase of the birds on which it preys.

One evening I paddled for some distance up a creek, to shoot something for supper. Here I met for the first time the beautiful heron called "Marana"; it was sitting quietly; the glossy, deep green leaves of a shrub forming a good background to its graceful form, and it appeared very tame. Evidently the bird creation of this remote creek had not often been disturbed by human beings. Further up it swarms with bitterns, boat-bills, darters, and other water-birds. As I paddled along, the bushy trees appeared to be alive with the odd-looking boat-bills, fluttering and flying out in all directions, seemingly convulsed with laughter.

"There are two kinds of curassow; the more common is white, with a black belly; the other, known as the Queen Curassow, is checked all over in much the same manner as the tiger-bittern. It is a handsome bird when seen in the woods, and erects its elegant crest gracefully as it utters its deep note. A pair of the pretty russet-brown "jacana," with lemon-colored wing feathers, kept flying in front of me as I proceeded up the creek, alighting from time to time on the floating grass which covered the water near the bank; owing to the immense length of their toes, they are able to support themselves on this. I also met with several mud-hens, which are much esteemed in this section for food by the creoles.

"Darters bred high up the creek; their downy young being generally seen in pairs in a nest formed of sticks, usually placed on a branch overhanging the water. They dropped out as I

approached, diving and swimming about very actively. The darter seems to have much difficulty in keeping its balance when perched on trees, the feet being placed on the body considerably behind the point of equilibrium; this formation gives them great power of swimming under water, but makes them look awkward when out of that element. The neck is long and snake-like, and the beak curiously serrated, and admirably adapted for seizing fish beneath the surface. The eggs are bluish-white, with rather a chalky shell, small for the size of the bird, and considered good eating by the native creoles.

"My Woukee bittern, which I had taken from the nest when very young, gave me much amusement, especially on these long, lonely rides. When I had passed the bar, and found myself in the long tranquil swell of the open sea, he began to show symptoms of sea-sickness, being unable to sit upright, and twisting his long neck about in the most grotesque manner; at last he went below, under one of the thwarts.

"The brown pelican is commonly seen in small flocks upon the coast and lagoons, engaged in fishing, or, with a steady, powerful flight, pursuing its way to more favorable localities. Its mode of fishing is curious; the bird soars upon its broad wings to a considerable height, and then, as soon as a fish is seen, it descends, beak foremost, upon the water with a sudden wheeling evolution, and with great force; seldom, however, falling to secure its prey. At other times, the pelicans may be seen swimming like geese in the shallows, composedly spooning up the shoals of fry with their capacious beaks. The quantities of fish consumed by them must be enormous. Occasionally, a solitary individual may be visible, perched apparently in contemplative mood, upon a convenient mangrove bough. Another curious bird seen there is the boat-bill, called by the Indians, "Cooper."

"A little green heron is everywhere commonly seen by the waterside, and may be easily recognized, while yet unseen, by its loud cry of "tuk-tuk-tuk." The plumage of the cock yellow-tail is of a deep russet-brown, changing to black on the head and back, and the tail feathers are of a bright yellow; the top of the beak is coral-red, and the cheeks pale blue. They are

sociable in their habits, living and breeding in flocks, and the branches of some favorite tree may often be seen covered with their long pendent nests. The difference in size between the cock and the hen is considerable, although the plumage is the same. They are probably attracted to these plantations by the quantity of ripe "panpa" and banana. Large flocks of a small kind are seen at certain seasons of the year. I shot several, but only secured one, the undergrowth of brush and cane being so matted together by creepers and bush-ropes.

"I sometimes saw among the pines very handsome hawks. The cry of the "bean-bean" is always to be heard on the savannahs. It has a curious knob of skin at the base of the neck. In color it is a sort of dull drab, shaded underneath with white. In habits, this bird resembles the magpie, hopping on the ground and amongst the branches of the trees, in the same springy manner. The hen-hawk is very common among the pine walks in the savannahs, and large green parrots fly chattering overhead, morning and evening. Their flight is exceedingly rapid and powerful. Trogons, pigeons, and other birds were to be seen in the thickets, and a red-headed woodpecker. However, there are few land-birds there. The white crane is very shy and will not admit of a near approach. Some large snipe, and rarely, a muscovy duck, would rise from the sedge."

UPON AN UNDESCRIBED SPECIES OF MEGASCOLIDES FROM THE UNITED STATES.

By Frank Smith.

Through the kindness of Mr. R. W. Doane of the Washington Agricultural College and School of Science at Pullman, Washington, I have recently received four specimens of a species of earthworm which I refer to the genus Megascolides. Mr. Doane writes me that this species is very abundant in that region of country and that their burrows are sometimes

seen extending to a depth of over fifteen feet, in cuts for new roads. I am also informed that much larger specimens than those sent me, are often found.

The specimens were killed at a time when they were not at the height of sexual activity, and are not in perfect condition for histological study, hence I have prepared this preliminary description to be followed by a more extended account after the receipt of more material.

Megascolides americanus n. sp.

Alcoholic specimens are 18–19 cm. in length and .6–.7 cm. in diameter. The number of somites in four specimens averages 226 with extremes of 240 and 190. The prostomium is incomplete. The clitellum is upon XIII | XXII and part of XXIII, and is incomplete ventrally. Median intersegmental genital papillae are present upon XIV | XV, XV | XVI and XVI | XVII, and paired intersegmental papillae upon XIX | XX and XX | XXI. The median papillae are wanting upon one specimen. Oviducal pores paired on XIV. Spermiducal pores paired on XVIII. Setae paired, those of the inner pairs being closer together than those of the outer ones and all in the ventral half of the worm. Penial setae having ornamented distal part are present in XVIII. There are dorsal pores posterior to the clitellum.

The septa VII | VIII to XII | XIII inclusive are much thickened and are connected with each other by longitudinal fibres, while the septum VI | VII is less thickened and that of V | VI is quite thin. The pharynx has a thick dorsal wall. A powerful gizzard is present in V. The oesophagus is enlarged in each of the somites XII | XIV where the walls are thick and vascular, while somites XI and XV have smaller enlargements. The intestine begins at XIX, but does not attain its greatest diameter until it reaches XXI. The nephridia are diffuse and begin as far forward as IV. They are numerous in each of the somites containing them and large in none. Each somite has numerous nephridiopores. The dorsal vessel is single. Swollen vascular arches or

"hearts" are present in X–XIII, the posterior ones being the largest.

Testes and large conspicuous spermiducal funnels are present in X and XI, sperm sacs in XI and XII, ovaries in XIII and spermathecæ in VIII and IX. The sperm ducts of either side unite in XVI to form a common duct. The pair of spermiducal glands is in XVIII. They are tubular and much contorted and form flattened masses of considerable size. The terminal part forms a muscular duct which opens to the exterior laterad of the penial setæ, though in the same pore. The common sperm duct of either side unites with the spermiducal gland of its own side at the proximal part of the muscular duct.

Three species of earthworms quite closely allied to *M. americanus* have been described from the Pacific Coast region by Eisen and by Benham under the generic names Argilophilus and Plutellus, which have since been included by Beddard in the genus Megascolides; but the great majority of the nearly related worms are found in the Australian region. *M. americanus* differs from its North American relatives in the presence of numerous small nephridia in each somite instead of two large ones, in the extent of the clitellum and in several other characters.

Our knowledge of the proper classification of species included by different writers in the genera Megascolides, Cryptodrilus, Argilophilus and Plutellus is at present in a very unsatisfactory state, but the species described above is quite certainly a Megascolides. UNIV. OF ILLINOIS, FEB. 25, 1897.

BIRDS OF NEW GUINEA.

BY GEO. S. MEAD.

(*Continued from Vol. XXX, page 710.*)

Merops ornatus—the Variegated Bee-eater, according to Dr. Bennett the harbinger of spring in Australia, is abundant in New Guinea where it is sometimes seen in enormous flocks or succession of flocks, flying easily but not ceaselessly as if on mi-

gration bent. It is of a social disposition congregating together at all times like swallows and making nests in holes along river banks after the manner of the *Hirundinidæ*. Here in the sand excavations without soft nesting materials, five or six white eggs are laid. Although the bird is a pronounced bee-eater, its diet is not so limited as not to include other insects as well.

This species is of elegant form, slender and smooth-feathered. Light green, blue, black and saffron brown are the intermingled colors. From the fan-shaped tail project straight out two black quill shafts, an inch or more from the middle feathers, terminating in small spatulas. Herein lies the particular feature of this pretty bird. The long, sharp black bill with its curving line of beauty adds another element to make it as Mr. Wallace found years ago, "one of the most graceful and interesting objects a naturalist can see for the first time."

On the head plays an exquisite shade of brown extending down the neck. A similar tint lines the under side of the wings as well. The under parts are a vivid green approaching to light blue on the abdomen, but on the sides a spot or two of black may be traced. Blue of a decided depth covers the lower back, rump and throat. The wings above are of the same color as the under parts, becoming brown to dusky on the scapulars and secondaries. So varied is the coloration and so delicate the blending that the most elaborate description would not exhaust the catalogue of charms. Yet the bird after all is easily identified, besides being common in museums and of wide distribution. Moreover it is not of shy habits but may frequently be seen darting forth from some twig after the manner of flycatchers in pursuit of insects, but little disturbed by the notice its graceful motions have excited. Length about 7 inches.

An exceedingly abundant bird in New Guinea, Queensland and everywhere in Malaysia is the Glossy Starling—*Calornis metallica* (Temminck). D'Albertis speaks of these starlings as flying in myriads over his house on Yule Island in June, at that time probably pursuing their migratory instincts which, however, in these low latitudes mean little more than a trip across

the Straits or over shallow seas. Mr. Moseley bears witness to the great numbers of this busy bird in his interesting Notes of a naturalist. He writes: "An immense tree with a tall stem free from branches, until at a great height it spread out into a wide and evenly-shaped crown, was full of the nests of the Metallic Starling. There must have been 300 or 400 nests in the tree; every available branch was full of them." The long slender body of this starling is entirely glossy black with purple, violet and green reflections. On the upper breast the overlaid plumes throw off a bronze or brownish tinge. The tail is spreading and graduated, the two middle feathers extending about an inch beyond the others. Length about 9 inches.

Speaking generally the Pittas or Ground Thrushes as they have been named, are of soft, brilliant and velvety plumage wherein the colors though contrasted, blend with most harmonious effect. In figure and shape they suggest the rail, having furthermore the short tail of that bird. In habits also they are not dissimilar, being shy and retiring, keeping within the gloom of the dense forest from whence their duplicated whistle sounds like a plaintive lament in the deep silence. They live chiefly upon insects and worms.

Pitta maxima or *gigas* found on the island of Gilolo, which Mr. Wallace rightly calls "one of the most beautiful birds of the East," is of large size being about 10 inches in length and standing to nearly the same height. This typical species is a glossy black above including the neck and throat. The under parts are velvety-white excepting the abdomen which is black but with the crissum and under tail coverts a fine scarlet, a characteristic mark of this family.

A shining blue beginning near the shoulder and banding the wings broadly, becoming less bright as it widens, adorns the sides. The specimen which is splendidly mounted and shown to great advantage in the Fairbank's Museum in St. Johnsbury, Vt., has a red feather in the upper tail coverts; whether this is anomalous may be questioned but I have also seen a white feather in one bird. The long strong legs of this giant of his tribe render it comparatively easy for him to make

rapid progress through the intricacies of the pathless woods; the wings seem little used.

Mr. Wallace found the beautiful *Pitta concinna* at Lombock. It frequents the "dry plains densely covered with thickets, and carpeted with dead leaves" and was so shy that only by much strategy could Mr. Wallace get a shot at it. By imitating the peculiar whistling cry of two notes, he finally succeeded in shooting one of the birds that came near. They hop or run along the ground picking up insects, and on the slightest alarm take refuge in some thickets. The plumage is very soft and puffy. The upper body is a rich green, beneath a soft buff, very dark on the belly; around the vent and over the under tail-coverts lies the usual lovely crimson. The head is deep black divided by two narrow strips of blue and brown running over the crown as far as the nape. Bright blue appears in bands along the shoulders and near the tail. Throat, side face and neck are black as well as the under wing-coverts. A bunch of cloudy white lies near the black throat. A white spot or two marks some of the primaries. Bill black, feet brown. Length 6.5 inches.

Pitta strepitans is Australian but found in Southern New Guinea as well as on adjacent islands. In this species also the upper parts are dull green with black on the wings, and a white speculum, but dim blue plays over the upper wing-coverts and rump. The lower parts are mainly identical in color with those of *P. concinna.* In fact the chief variation apart from height and length, is in the coloration of the head. In the present species this is dark brown with black stripe intermediate. There is little significance in its name. Length 8.5 inches.

Pitta rufiventris from Gilolo and Batchian, is smaller than the preceding by at least an inch. Above green is the prevailing tint but of a paler cast. Blue as in the foregoing, the black being distributed in the same way also with the customary white speculum. Head and throat are rufous. The usual crimson somewhat dull, appears on the belly adjoining black. On the breast is a wide border of blue. There is little varia-

tion in the colors of the Pittas and but little difference in size or shape. The present bird is about 5 inches in length.

Pitta novæ-guineæ, notwithstanding the similarity between the Pittas generally is distinguished by somewhat more vivid colors than its congeners. Above it is a shining green, below a darker bluish-green. The head, entire neck and throat are black, the tail a dull green. The abdomen is black, giving space for the invariable crimson around the vent and upon the under tail-coverts. Much bright blue covers the upper wing-coverts, while the primaries have the customary white spot on their dark brown surface. Upon the rump this lovely blue is narrowed to the merest streak. A line of silvery white dividing the black throat from the oily-green breast is the specific mark. Length 6.5 inches.

Pitta macklotii is dull green above with blue and black on the wings and rump. Below the color is like that of the preceding species, though perhaps not quite so vivid. The cap is brown with bluish reflection. The throat below the chin is almost black. Total length 7 inches. This is about the average size of the Pittas and like his relations the *Macklotii* has the shy timid habits, retiring to the depths of thickets at the slightest alarm his whereabouts only to be suspected by the plaintive note uttered now and then.

Two or three species much resemble *Pitta novæguineæ*, the differences between them being but slight. In *P. rosenbergii* we find the colors somewhat more pronounced. Underneath along the sides is a length of purple gloss, while on the throat there is a greater extent of black. Length 7 inches. Habitat Mysore.

A local variety if not a distinct species belongs to Geelvink Bay and is dubbed *P. mafoorana* (Schlegel). Here also the colors are deeper, while the white spot does not appear at all. In all these instances the size is about the same.

The brighter green on the breast of the Mafoor Island Pitta fades into a greenish-blue on the sides. The larger upper tail-coverts are black, the lesser feathers green, identical with the coloration of the breast. *Coracopitta lugubris*, classed among the Pittidæ, is entirely black and of small size, reaching only

the length of 5.6 inches. The tail of this solitary species of its kind is rather longer than among the true Pittas. Its legs are long while a peculiar bristling of the frontal feathers distinguishes it still further from its family.

Honey-eaters are well represented in New Guinea and its islands; in fact several islands of the Malay Archipelago contain a species, even a genus peculiar to themselves. They are never large birds, the average size being perhaps 8 inches in length, but they differ largely in respect to plumage, many of them being plain, others conspicuous by their brilliancy or some striking arrangement of color. Mr. H. O. Forbes has told us how lovely certain forms of *Myzomela* are, and one in particular—*M. annabellæ*—collected in Timor-Laut, embellishes as frontispiece, "A Naturalist's Wanderings."

Ptilotis filigera (Gould)—the Streaked Honey-Eater—from Northern Australia and Southeastern New Guinea is only imperfectly described by its name. The streaks are rather obscure markings, spots or shadings upon a portion of the generally brownish surface. Bare whitish spaces irregular in form surround the eyes. Just above the extended line of bare skin lies a patch of black. Above this the head is dark brown, the same color as that of the long tail on its upper surface. The neck, throat, breast and sides are a bluish-gray, lighter on the throat, The under parts are a soft fawn color, at times reddish, particularly on the flanks. The upper parts are a delicate brown, mottled and streaked along the bend of the wings. The bill is unusually long, dark and strong. Total length 8 inches.

The naturalist Moseley of the Challenger Expedition saw many of these little birds together with a kindred species *P. crysalis* at Cape York where they were busily employed in sucking the honey or eating the insects in the scarlet blossoms of the Erythrina tree. The last mentioned Honey-eater—*P. crysalis*—Mr. Guillemard collected on the shores of New Guinea.

Ptilotis albonotata—the White-spotted Honey-eater—a new species when Salvadori named it twenty years ago, is also a plain member of the large family of the *Meliphagidæ*. The white spots of the present species are small the largest appearing just behind the ear. On the bend of the wings is a line of white,

while one or two more touches of white may be seen on the wing-coverts and middle of abdomen. The ground color above is yellowish-green, below buff. A distinct line of yellow marks the side of the face. Eye, bill and feet black or dusky. Total length 5 inches.

Ptilotis cinerea (Salvad.) the Gray Honey-eater is much larger than the preceding species measuring about 8 inches in length. Upper surface with tail is brown, gray of a somewhat dingy hue, marking the under body and head. The bill is noticeably strong and curved. Its color is black. The eyes are black and prominent. White quills are conspicuous on the wings and tail.

Another interesting member of the *Meliphagidæ* found by Senor D'Albertis in 1872 is *Melidectes torquatus*, so-called from the torque or partial circlet of white, around the neck. Like its race it has the curving bill, long tail, bare orbits and other peculiar marks which characterize the honey eaters. This species is fuscous above, tail and wings dark olivaceous, containing white spots on the black inserscapular feathers. Black or dark appears on the side face and throat, and again over the upper breast below a band of white somewhat longer. This is margined below by a narrow line of dull yellow about the same tint as that around the eyes and side neck. Under parts are mainly whitish, passing into yellowish near the vent and much marked with black spots along the sides. Feet, bill and iris are almost black. The sexes do not differ noticeably and are both about 8.5 inches in total length.

EDITOR'S TABLE.

—THE greater part of the American newspaper press needs a radical change of heart in the matter of reporting on subjects which come within the domain of biology It would pay the leading newspapers at least to have a scientific editor or referee to whom all paragraphs and articles on such subjects should be referred before publication. As the

case now stands, it is not safe for any person to accept their statements in the department referred to, as truth. It is to be supposed that newspapers, with some conspicuous exceptions, prefer to publish the truth, and are fully impressed with the fact that their circulation depends largely on the trustworthiness of the statements which they make. The conspicuous announcement of false statements by newsboys may sell more copies on the street, but such publication can scarcely invite regular subscribers. We have, in previous numbers of THE NATURALIST, selected a few cases where foreign scientific journals have been misled by some of the customary misstatements and fictions of the American press, and we regretfully allege that the only safe course for scientific journals to pursue is to ignore everything that proceeds from this source, unless it appear over some responsible signature. This state of affairs is regrettable, since, in many respects, American journalism is the best in the world. It should maintain this position by securing accuracy in the direction referred to. Popular interest in biology was never greater than it is now, and a newspaper whose reports in this direction are reliable would certainly profit by it. This statement covers all cases, from the latest discoveries in bacteriology, paleontology, etc., down to descriptions of the habits of wild and domesticated animals. It would be better to publish nothing at all than the fictitious and inaccurate statements to which we are accustomed. These naturally diminish the respect in which the press is held, and reflect on our character as a people among the nations of the earth.

—THE proposition to consolidate the scientific work done by the United States Government into a single bureau has been recently made. Such schemes are pleasing to the eye, but their practical bearing is of far greater importance both to the Government and to science. The proposition has been opposed on good grounds, and such as should be, in our estimation, fatal to it. It is a good general rule not to "put all one's eggs into one basket," when there is anything precarious about the basket. Moreover, it is obvious that different departments must have their own scientific assistants, precisely as they have their own employees in other directions, if their work is to go on without continual interruption and loss. The experience of the departments and bureaus with the Government printing office has been cited in proof of the evil effects of such consolidation. The evil is becoming so apparent that it is now evident that the time has come for the work of that bureau to be restricted to congressional printing, and that for departmental printing each department shall have its own printing office. This is

especially important as regards the productions of the Government scientific experts. Their results may lie in the hands of the Government printer for two or three years before publication, a state of affairs which should not exist in a progressive country. The progress of science is rapid, and our bureaus at Washington should be able to publish their results as soon as they are prepared for the press.

—A COLLECTION of living monkeys and snakes was recently seized by the New York Custom House authorities and sold by auction for the nonpayment of duty. It is strange that our tariff law has not yet been corrected so as to permit the importation of such objects free. They contribute to the educational material of the country both while living and after their death, and it would seem that the scientific work of the country should command sufficient respect to enable such a change to be made. Of course the Committee of Ways and Means has no especial desire to stimulate the growth of the native species of monkeys and snakes by levying duties on foreign species. We venture the assertion that the native production of these articles will not be seriously affected by acts of Congress.

RECENT LITERATURE.

Experimental Morphology.[1]—It is a pleasure to learn that the activity of the new German school of "Entwicklungsmechanik" has stimulated so happy a response on this side of the ocean as that in the book before us. The author's aim is to collect, in order, the observations and results thus far gained by the experimental method as applied to the understanding of "*why*" organisms develop as they do. Knowing, then, what has been attempted, we may more clearly advance with definite purpose and prospect of success.

The present volume treats of the effects of outside reagents upon *protoplasm:* three following volumes are promised, to treat in the same way, *growth, cell-division, differentiation.*

Such agents are somewhat arbitrarily divided into the following heads of chapters: chemical agents; varying moisture; density of the medium; molar agents; gravity; electricity; light; heat.

The chapter on chemical agents considers the change in motion, change in metabolism or the death of organisms acted upon by various

[1] Experimental Morphology. Charles Benedict Davenport. Woodcut, pps. 280. The Macmillan Co., 66 Fifth Ave., New York. Price, $2.60.

poisons and other chemical bodies. The question of acclimatization to chemical agents is especially well treated and partly based upon the author's own work.

Though essentially a compilation of facts, and hence not always free from the criticism of introducing statements upon doubtful authority —especially when one considers the author's great regard for accuracy and the comprehensiveness of knowledge necessary in experimental work —there is much that is original in the summarization at the end of chapters. Original work by the author is also included, and illustrated by some of the simple, but effective, diagrams as those showing the movements of amœbæ in light and in darkness.

The author's experiments upon amœba lead him to differ from Verworn and to decide that this lowly organized creature is strongly affected by light.

Such fundamental work is of the greatest interest to all biologists, whether devoted to botany or zoology, morphology or physiology, chemical or physical sides of life phenomena, and this chronicle of it should be of great interest to all who have escaped, or outgrown, that unfortunate myopia that too often limits the interests of the specialist. That the book is called a morphology is misleading as to its content: scientific physiology, without dependence upon medical instruction, would more fitly characterize it.

We trust the book will find the appreciation it so well deserves, both among specialists and among the intelligent laity.—E. A. A.

Oceanic Ichthyology.[2]—This work, issued as a special Bulletin in quarto form by the U. S. National Museum, is the joint production of Messrs. G. Brown Goode and Tarleton H. Bean. Its preparation has extended over a number of years. As first planned it was to include only the oceanic fishes on the east coast of North America. As new material was acquired by the Museum from collections made by the steamers Blake, Albatross and Fish Hawk, and from other dredgings of the U. S. Fish Commission, the work expanded to its present form, and it now stands as a "compendium and summary of existing klowledge in regard to Oceanic Ichthyology." The discussion takes the form of descriptions of all forms of pelagic and deep sea fishes found in the seas of the world, special prominence being given to those of the Atlantic Ocean.

[2] Oceanic Ichthyology: A Treatise on Deep-Sea and Pelagic Fishes of the World, with an Atlas containing 417 Figures. By G. Brown Goode and Tarleton H. Bean. Special Bull. U. S. Natl. Mus., Washington, 1895.

As many of the specimens are unique, and much of the material fragmentary and hard to preserve, the descriptions have been made exceedingly full, so that a possible loss of material may not mean a total loss to science. Existing data concerning oceanic fishes have been carefully collected and incorporated with the authors' own observations in such a way as to be most serviceable for comparison and study by other naturalists.

A brief introduction deplores the meager knowledge of abyssal life, and points out that a more extended exploration of oceanic depths will reveal innumerable new forms.

A list of new genera and species shows 55 of the former represented by 153 of the latter.

The work comprises 553 pages of text and 123 plates, the latter issued separately as an atlas accompanying the text. It will be for many years the only text-book of the subject. A melancholy interest attaches to it as the last and most important contribution to science made by Dr. Goode. His death occurred almost immediately after its completion.

Fishes of North and Middle America.[3]—This work takes the form of a descriptive catalogue of the species of fish-like vertebrates found in the waters of North America, north of the Isthmus of Panama. It includes, besides the fresh-water forms, those of the off-shore banks and continental slopes of both oceans, the waters of the Gulf Stream, and also the Pelagic and abyssal forms that occur north of the equator. The present volume contains descriptions of 1,627 species belonging to 522 genera. These in turn are classified into 148 families, ranged under 28 orders. The authors recognize but 3 classes: Leptocardii, Marsipobranchii and Pisces, relegating to Pisces all fish-like vertebrates with paired fins. Sixteen new forms are described, and in the classification of these species the authors have found it necessary to create 1 new family, Steinegeriidæ, and 16 new genera. It has also been deemed advisable, for closer definition, to introduce 24 new subgenera.

We find in this work both conspicuous merits and demerits. Its greatest merit is the thoroughness of the work done in the discrimination of the species enumerated, and the appropriateness and conciseness of the descriptions. This is the principal labor involved in the preparation of the book, and it is this which constitutes its chief utility to the student. The excellent practice of furnishing analytical keys, which greatly facilitates determinations, is followed. It is a monument of

[3] The Fishes of North and Middle America. By D. S. Jordan and B. W. Evermann. Bull. of the U. S. National Museum, No. 47. Pt. I, Washington, 1896.

labor which has extended over many years. The demerits count but little against the value of the work in this fundamental respect.

However, we think the authors would have been wise to have restricted the scope of the book to the Medicolumbian region. It would have had then a definite application, giving it a more monographic character, and future monographs of the Neotrophical realm and its subregions would not overlap it. Next, we find the systematic defective in those points where it comes in contact with the extinct forms. Want of consideration of these necessarily destroys the perspective as to groups which have many extinct allies. We find that in endeavoring to do justice to Rafinesque they have gone to a greater extreme than the circumstances require. A good many species retain his names which can only be suppositiously identified by the method of catching fishes in his original localities. Such a method leads to no certain result, and does injustice to better work done by his successors. Finally, we object now and always to the preservation of words which are misspelled or false as to matter of fact as names, on the supposition that the law of priority requires it. When this all important law is made to apply to cases, which educated men never supposed possible, we have either an illustration of excessive idealism, or of Chinese imitation. Thus, the authors say (p. 330) respecting the name *Macrodon malabaricus*, given by Bloch to species confined to South America: "In the judgment of the present writers the law of priority, by which the first unpreoccupied name is right and all others wrong, a rule which tends to secure fixity of nomenclature, is more important than any rule leading toward truthfulness or purism in the name itself. On this ground *Macrodon malabaricus* does not mean a Macrodon from Malabar. It simply designates that Macrodon of which the earliest unpreoccupied binomial specific name is malabaricus. The errors in meaning in specific names deceive nobody and rarely cause inconvenience." We quote this paragraph in full, because it is an illustration of a legal plea in a bad cause. Its authors deeming truth of less importance than the letter of some law, do not hesitate to stretch the truth in defending their case. Malabaricus does mean of or from Malabar, and everybody is deceived by it except experts in the science, who have gotten their information from other sources. The habit of disregarding the truth is a bad one, especially in scientific methods. As to the cases of misspelling, which the authors have so religiously preserved, it may be regarded as certain that the educated American will be no more inclined to present himself with an unwashed face in good society than his European colleagues.

We hope that the second part of this work will soon be issued; but we understand that some delay in the publication is to be expected in the present condition of the Government printing office.—C.

Evolution or Creation.[4]—The author of this discussion calls it a "critical review" of the scientific and scriptural theories of the universe. The criticism loses its value when he states in the opening chapter, not only his bias towards, but his firm belief in the Biblical account of creation, "*literatum et spellatum.*" In stating the evolution theory he allows his imagination free play, unhampered by any conception of its real meaning or its bearing on the study of the problem of life as we find it developed on this planet.

Among the original hypotheses offered for the reader's consideration is one that dates the Mosaic week of creation somewhere about the end of the ice age. This, says the writer, "solves a score of scientific and exegetical difficulities that hitherto have been paraded as fatal to the credibility of the sacred Scriptures;" but it also leaves us completely at sea as to the author's views of the origin of the forms of life that preceded this so-called "Creation." Or, does he generously leave time, space and material for the evolutionist to demonstrate his theories?

Again, Mr. Townsend assumes a knowledge of the ways and means of the Creator, which is startling, even to a naturalist. His description of the genesis of man would appear to better advantage in the pages of the modern realistic novel than it does in a critical essay. Finally, we are gravely told that the "chief end of the creation" (not only of the world but) "of the universe, is so glorify *man* and enjoy him forever." We refer to this book not because it has any value, but, because in this country where biological education is only beginning to be general, a good many persons may suppose that it has.

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General Notes.

PETROGRAPHY.[1]

Augen-Gneiss and Intrusive Rocks at Bedford, N. Y.—Luquer and Riess[2] mention an augen-gneiss near Bedford, West Chester Co., N. Y., as covering an area of 15 square miles. The augen are in large part orthoclase or microclinic crystals that have been squeezed and flattened. They often occur in bands and are always elongated parallel to the foliation of the gneiss in which they lie. The rock shows abundant evidence of mashing, the large orthoclase constituting the augen being bent and the quartz grains associated with them being much granulated. The origin of the gneiss is ascribed to the dynamic metamorphism of an acid igneous rock. Diorite dykes and great veins and masses of pegmatite occur in the gneiss. The pegmatites are regarded as vein masses produced by segregation agencies.

The Basic End-member of the Augite-Syenite-Nepheline-Syenite Series.—In the Lujavr-Urt on the peninsula of Kola, Russia, occurs the feldspar free nepheline-pyroxene rock to which the name iolite has been given. Associated with it is an orthoclase bearing rock whose chemical composition is similar to that of the nepheline porphyry from Magnet Cave, Ark., and from Beemerville, N. Y., (sussexit of Brögger) and of borolanite from Borolan. An analysis of the supposed iolite shows it to differ from typical iolite in possessing only aegirine among its bisilicate components, and to be much poorer in CaO than the typical rock. The composition of iolite from Iiwaara is given in (I), while that of the Lujavr-Urt rock is shown in (II). The composition of the basic end-member of the quartz-augite-syenite nepheline-syenite series as calculated by Brögger is shown in (III). The author admits that the Lujavr-Urt rock may be regarded as an

	TiO_2	SiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	CaO	MgO	K_2O	Na_2O	P_2O_5	H_2O		Total
(I).	1.70	42.79	19.89	4.39	2.33	.41	11.76	1.87	1.67	9.31	1.70	.99	=	98.81
(II).		45.43	28.77	3.10	.40		1.86	.22	3.38	16.16			=	99.32
(III).		45.	25.	6.5			2.0	1.5	7.0	12.		1.00	=	100.00

aegerine iolite, but he prefers to give it the distinctive name urtite. It is defined as a light colored, median grained rock composed of black

[1] Edited by Dr. W. S. Bayley, Colby University, Waterville, Me.

[2] Amer. Geologist, XVIII, p. 239.

aegerine particles in a mass of nepheline and apatite, the proportional quantities of the three minerals present being about 12 per cent. of the first named mineral, 86 per cent. of nepheline and 2 per cent. of apatite. The orthoclase bearing porphyritic rock referred to above, is intermediate in composition between genuine iolite and urtite.[3]

The Anorthosites of the Rainy Lake Region.—Coleman[4] describes a number of additional occurrences of anorthosite near Bad Vermilion Lake, Ontario. The rock is in the main a white aggregate of bytownite or anorthite with the addition of a little chlorite or serpentine and an occasional augite grain. The plagioclase grains are often idiomorphic, and in some places the anorthosite passes into a porphyritic gabbro. Often the feldspars are enlarged by newly formed labrodorite, and in one section a bytownite crystal has been broken apart and its fragments cemented by the more acid plagioclase. The author dissents from Lawson's view that the anorthosite in this region represents the denuded core of an old volcano, which later extruded granite. He is inclined to regard the basic rock as much older than the acid one. Analysis:

SiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	CaO	MgO	Na_2O	K_2O	CO_2	Total	Sp. Gr.
46.24	29.85	1.30	2.12	tr	16.24	2.41	1.98	.18	1.03	= 101.35	2.85

Coleman suggests that all the rocks consisting almost exclusively of plagioclase shall be called plagioclasites, and the name of the plagioclase which is their principal constituent shall be prefixed to this. According to this scheme the name of the rock described above would be anorthite-plagioclasite.

Volcanic Rocks of the Fox Islands, Maine.—Reference has already been made in these notes to the existence of volcanic rocks in the islands of North Haven and Vinal Haven. Smith[5] has recently made a very careful examination of these rocks from both a geological and a petrographical standpoint. He finds the rocks on North Haven to consist of diabase schists and schistose tuffs, a series of acid volcanics and a small area of Niagara slates, limestones, etc. Vinal Haven is made up of acid volcanics, a series of fragmental schists and large masses of granitic and basic intrusive rocks in addition to acid volcanics like those found on the northern island. The greenstone schists of

[3] Ramsay: Aft. u Geol. Fören i Stockh. Förh. 18, 1896, p. 459.

[4] Journal of Geology, IV, p. 907.

[5] The Geology of the Fox Islands, Maine. Pub. by the author. Skowhegan, Maine, 1896.

North Haven are squeezed normal and amygdaloidal diabases and diabase tuffs. They are probably pre-Niagara in age. The fragmental schists in Vinal Haven are also probably pre-Niagara. They comprise mainly quartzites and quartzitic slates. The basic volcanics are altered andesites, porphyritic diabases and andesites, and various pyroclastics. They were erupted in Niagara time. Following the basic lavas come the acid ones of Vinal Haven, consisting of various types of rhyolite, among the most interesting of which is a spherulitic rock containing spherulites of several different kinds. The commonest kind is composed of branching radiate fibers of feldspar imbedded in a granular aggregate of quartz. Flow breccias and tuffs occur intermingled with the massive rhyolites. The volcanic rocks are cut by dykes of quartz porphyry of felsite and of diabase. The large intrusions of the southern portion of Vinal Haven are granites, diabases (the black granite of the quarrymen) and diorites. The granites are typical biotitic phases containing some hornblende. Near the contact with the diabases they are porphyritic. The diabase of the southern end of the island is an olivine variety, while that in the eastern part is a transition phase between diabase and diorite. It contains brown hornblende and biotite in equal quantities with augite. Some phases have in addition a considerable quantity of quartz. The diorite and diabase are older than the granite, and both granite and basic rocks are believed to be much later than the volcanics. The only rocks of the two islands that show evidence of dynamic metamorphism are the old diabasic schists of North Haven. All however present many evidences of metasmatic alteration. Their structure remains intact, but their mineralogical composition is quite different from what it was originally. The basic lavas are saussuritzed and their ferro-magnesian constituents are chloritized. The glassy lavas are devitrified.

Petrographical News.—Pockels[6] argues that the magnetic polarity exhibited by many different kinds of rocks is due to conduction of electricity from the air. They are 'charged.'

Brauns[7] describes a micro-chemical test for nitrates. A drop of the solution suspected of containing a nitrate is treated with a drop of barium chloride and warmed in the water bath. Upon cooling octahedral crystals of barium nitrate will crystallize if nitrates were originally present.

[6] Neues Jahrb. f. Min., etc., 1897, I, p. 66.
[7] Ib., p. 73.

Doelter[8] describes a number of syntheses of rock forming minerals and a series of experiments relating to the influence of mineralizers in the production of rock components. The descriptions close with remarks on the conclusions of petographic interest that may be deduced from the experiments.

The same author[9] declares as the result of microscopic and field studies that the granite of the Bachergebirge is an intrusive rock although it possesses gneissoid features. On maps of the district a granite porphyry is separated from the normal granite in coloring. This the author believes to be a mistake, as the two rocks are parts of the same magma.

The Koralps[10] are composed of mica-schists, interlaminated with amphibolites, eklogites, marbles and gneissic pegmatites. The mica-schists are overlain by phyllites and green schists. The pegmatites are of three kinds—a schistose aggregate of large tourmalines and feldspars, a granular aggregate of tourmaline, quartz and a little feldspar, and a massive quartz-rock containing a little tourmaline and feldspar. The amphibolites are in part garnetiferous.

GEOLOGY AND PALEONTOLOGY.

Rocks of the Antarctic Continent.—The rock specimens obtained by W. S. Bruce from floating ice and the stomach of Penguins in the Antarctic seas have been examined by Prof. Geikie, who makes the following report:

The larger specimens are all basalt, and contain a good deal of olivine. The small fragments are also mostly basalt, with some trachyte. All the specimens are what one finds upon the coasts of a region composed of igneous rocks. There was no trace of sedimentary or schistose rocks among the samples.

The marine deposits obtained by Mr. Bruce off the eastern extremity of Joinville Island were determined by John Murray and Robert Irvine. The specimens came from depths of 130 to 235 fathoms. They consist of fragments of polyzoa, basaltic gravel, basaltic and quartz sand, and blue mud. The latter contains mineral particles, which indicate that on the adjoining land will be found true continental rocks. (Geog. Journ., 1896.)

[8] Neues Jahrb. f. Min., etc., 1897, I, p. 1.
[9] Mitth. des Naturw. v. f. Steiermark, 1894.
[10] Doelter, Ib., 1895.

Queries on Rock Differentiation.—The theory of the differentiation of rock magmas, now so generally held by lithologists, is questioned by Mr. G. F. Becker. The following is an abstract of his discussion of the subject:

"All known processes by which the segregation or differentiation of a fluid magma could take place involve molecular flow. This is demonstrably an excessively slow process, excepting for distances not exceeding a few centimeters. Soret's method, even if it were not too slow, seems inapplicable, because it involves a temperature unaccountably decreasing with depth. The normal variation of temperature, an increase with distance from the surface, would be fatal to such segregation. The least objectionable method of segregation would be the separation of a magma into immiscible fractions; but this seems to involve a superheated, very fluid magma, while the law of fusion and the distribution of phenocrysts in rocks indicate that magmas prior to eruption are not superheated to any considerable extent, and are very viscous.

"The homogeneity of vast subterranean masses called for by the hypothesis of differentiation is unproved and improbable. The differences between well-defined rock types are more probably due to original and persistent heterogeneity in the composition of the globe. Hypogeal fusion and eruption tend rather to mingling than to segregation, and transitional rock varieties are not improbably mere fortuitous mixtures of the diverse primitive, relatively small masses of which the lithoid shell of the earth was built up." (Amer. Journ. Sci., 1896.)

The Coal Measures of Arkansas.—The descriptions of marine fossils from the Coal Measures of Arkansas, by Mr. J. P. Smith, are of especial interest, since they afford means of correlating strata of different regions, and also because marine fossils are usually rare in the Coal Measures. Among the important finds are two species of Pronorites, to which the writer refers as follows:

"The finding of Pronorites in Arkansas is of great importance, since it is the ancestor of a form, Medlicottia, which, though unknown in Arkansas, has been found at no great distance, in the Texas Permian. These occurrences help to prove the continuity of life from the Carboniferous into the Permian, and to show that the same conditions existed here as in the Artinsk region of the Ural Mountains, where the Carboniferous beds contain the goniatites, out of which most of the Permian ammonites were developed."

The relations of the strata in which these fossils were found to the Coal Measures in both the Old World and the New is shown in a cor-

relation table accompanying the descriptions. (Proceeds. Amer. Philos. Soc., XXXV, 1896.)

The Lead and Zinc of Iowa.—In a report on the Lead and Zinc Deposits of Iowa, Mr. A. G. Leonard states that these ores occur in crevices in the Galena limestone in the northeastern part of the State, in what is known as the driftless area. Contrary to the general rule, that ore deposits are found with areas of disturbance in the earth's crust, the ore deposits of the upper Mississippi are found in strata which show no evidences of having been subjected to dynamic forces. The author accepts Chamberlain's theory as to the localization of these ores, viz., currents of the old Silurian sea. The oceanic waters impregnated with metallic salts derived from the leaching of the adjacent lands were borne by currents to areas where there was an abundance of organic life, and here the metals would be extracted and thrown down along with the sediments. As to the filling of the crevices, he adopts the lateral secretion theory, as being more in accord with his observations. (Iowa Geol. Surv., Vol. VI, 1896.)

The Eruptive History of the Yellowstone Park.—Mr. Hague collates a series of facts to demonstrate that the pouring out of igneous rocks in the Yellowstone Park began with the post-Laramie uplift, or closely followed it, the outflow continuing with greater or less energy throughout Tertiary time. The great value of paleobotany as an aid in determining the age of geological formations is illustrated in this region. At least five distinct and important geological periods are defined by their fossil flora, of which four are exposed in the park within a few miles of each other.

The following table shows the relationships between the different geological formations and the floras which characterize them:

Formations.	Flora.	Age.
Basic breccia	Lamar	Upper Miocene.
Intermediate breccias	Intermediate Flora	Lower Miocene.
Acid breccia	Fort Union	Eocene.
Agglomerates, Waterlain	Livingstone	Cretaceous.
Igneous Material.		
Sandstone	Laramie	Cretaceous.

(Amer. Journ. Science, 1896.)

The Atlantic Coast Eocene.—A study of the Middle Atlantic Coast Plain, with a view to its correlation with the Gulf region, by Wm. B. Clark, has recently been published by the U. S. Geol. Surv. The author reviews critically the characteristics of the Eocene strata as developed in the States of Delaware, Maryland and Virginia. While the geological and stratigraphical data are examined with care, it is the paleontological record to which is given the most attention. Accordingly the report includes an exhaustive study of the fauna of the region under discussion, together with a critical review of the species described by previous authors, as well as the description of a number of new forms.

Briefly stated, the Eocene deposits of the Middle Slope are typically glauconitic, with an average thickness somewhat in excess of 200 feet. The organic remains consist largely of shells of mollusks, whose appearance indicates that they were but slightly disturbed prior to their burial in the sediments in which they are now found.

The fact that the strata are so largely made up of secondary materials shows that the position of accumulation was in the vicinity of a coast reached by no large rivers bearing sediment, while also, for the most part, sufficiently removed from the coast-line to be unaffected by shore conditions. These deposits, also, were very slowly accumulated. These conditions were markedly different from those prevailing in the Gulf region. There numerous large rivers discharged great quantities of material, so that the strata of the Middle Atlantic Slope must be represented in the Gulf by deposits many times their thickness.

After considering all the facts, the writer is decidedly of the opinion, "that the deposits under discussion represent the greater portion of the Eocene series of the Gulf, its upper members excepted. Compared with the section originally described by Prof. E. A. Smith, in the Alabama area, it undoubtedly comprises all or the major part of the Lignitic, Buhrstone and Claiborne, and, perhaps, also portions of higher horizons; but, regarding this latter point the necessary paleontological evidence is wanting. The reference does not, however, necessarily involve the assumption that the basal beds of the Potomac section are the exact equivalents of the Lignitic, since deposition may have commenced somewhat earlier than in the other, although the difference in time was not great." (Bull. U. S. Geol. Surv., No. 141, 1896.)

Glacio-Marine Beds of Europe.—Among the important observations made by Col. H. W. Fielden during his recent explorations of Arctic Europe was one concerning the deposition of glacio-marine beds. Owing to the rapid elevation of the Spitzbergen region, it is

possible to examine in detail the immense deposits originally formed in front of glaciers. These deposits now lie between the present shore-line and the edge of the glacier of to-day. The author instances a formation of this nature to be found at the head of Green Harbor, one of the minor indentations on the southern side of Ice Fiord, and describes it as follows:

"The front of the glacier that now occupies the valley is about a mile distant from the present shore-line. Fronting this glacier, the terminal face of which is about 50 feet in height, and extending for 1½ miles in length, is a range of some 50 to 70 feet high and ½ mile in width. These hills have undergone much subærial erosion, and channels have been cut in them by the numerous streams issuing from under the glacier. Following up one of these water courses, which average from 25 to 50 yards across, with a very level bottom, we find sections of mud and clay rising like walls on either side to a height of 50 to 60 feet. These beds contain numerous stones, but do not show any signs of stratification; in them I found shells of *Mya truncata*. That these beds are of submarine formation is confirmed by the existence of raised beaches in neighboring fiords and along the adjacent line of coast, at a higher level than the beds I am now describing. Between the present face of the glacier and the perpendicular wall of the mud-hills runs a sort of ditch, dry moat, or open space, some 30 yards in width, along the entire front of the glacier. The bottom of this ditch is thickly strewn with morainic débris, composed of rounded ice-worn stones, many being deeply grooved, scarred and scratched. Through this slope of rocks and stones glacier streams were pouring forth."

The author suggests, that since this process of rock accumulation probably went on when the glacier projected in the sea, that during the emergence period there would come a time when the bay-ice would freeze deep enough to incorporate the boulders of the moraine, and quantities of ice-scratched and ice-polished stones would be floated away on the breaking up of the bay-ice in the spring. This would explain the occurrence of the vast number of scratched erratics found in the glacio-marine beds of Kolgnev Island.

Observations made in Greenland show that in the neighborhood of glaciers discharging into the sea the water is charged with sediment, and the ship's anchor when lifted in front of some of these glaciers brings up a heavy weight of unctuous mud, thus confirming the theory that "water issuing from under a glacier in Polar regions, and discharging from under the ice into the sea, can lay down glacio-marine beds in the ocean," and the occurrence of ice-scratched stones through-

out these beds is also accounted for. (Quart. Journ. Geol. Soc., Pt. 4, 1896.)

Geological News.—Mr. R. P. Whitfield notes a new genus of Phyllocaridæ from the Lower Helderberg, near Waubeka, Wisconsin. He proposes the name *Entomocaris*, from the resemblance of the carapace to that of an ostracode entomostracan. (Bull. Amer. Mus. Nat. Hist., 1896.)

A recent paper by Mr. F. A. Bather gives a morphological description of *Uintacrinus socialis*, and discusses the relations of the genus to certain Paleozoic crinoids. He shows that Uintacrinus cannot be related either to the Camerata, as Jaekel has supposed, or to the Ichthyocrinidæ, as maintained by Von Zittel, Neumayer, and others. By a process of comparison and elimination he finally determines that of all the known genera Dadocrinus is probably the most nearly related to the ancestor of Uintacrinus. (Proceeds. London Zool. Soc. (1895) 1896.)

A new genus of fossil birds is reported from the Pliocene of South Australia. The specimens consisting of portions of a dozen birds were found at lake Collabonna. They are described by Messrs. Stirling and Lietz under the name *Genyornis newtonii*. The generic name refers to the conspicuous feature afforded by the relatively large size of the lower mandible. The femur indicates a gigantic bird, its dimensions surpassing those of *Pachyornis elephantopus*, and nearly equalling those of *Dinornis maximus*. (Trans. Roy. Soc. South Austral., XX, 1896.)

According to Lydekker, the affinities of the so-called extinct Giant Dormouse (*Myoxus melitensis*) are not with the Myoxidæ, but with the Sciuromorpha. He suggests for it the new generic title *Leithia*, defining the genus, and figures its type of dentition. (Proceeds. Zool. Soc. London, 1895.)

BOTANY.[1]

Long Stolons of Phragmites.—Several years ago some remarkable specimens of a running grass were brought to me from the islands of the Platte River in Central Nebraska. Although quite puzzling at first they were soon found to belong to the common Reed Grass (*Phragmites phragmites* [L.] Karsten). Some of the specimens were of astonishing length, one measuring a little more than seventeen meters! At every

[1] Edited by Prof. C. E. Bessey, University of Nebraska, Lincoln, Nebraska.

joint fibrous roots were sent out and from many of the joints there grew leafy stems, a meter or more in height. A careful investigation showed that these long trailing stems were at first underground stems, and that after growing under the surface for some distance, the sand had been removed by the shifting currents of water, thus exposing the stems to the air. These exposed stems, thereafter grew as stolons running over the surface as described above. I am told that occasionally these running stems almost entirely cover portions of the islands, and the broad sand-bars along the margins of the river.—CHARLES E. BESSEY.

Barnes and Heald's Keys to Mosses.—Botanists will welcome the new, revised and extended "Analytic Keys to the Genera and Species of North American Mosses" which appeared in January of the present year, as one of the Bulletins of the University of Wisconsin. The thick pamphlet includes about 220 octavo pages, eight of which are devoted to a brief introduction, thirteen to the key to the genera, eighty-one to the key to the species, and one hundred and eighteen to descriptions of the species and varieties which have been published since the issue of Lesquereux and James's Manual in 1884. Under the latter there are enumerated, six hundred and three forms, many of whose descriptions are here available for the first time to most American botanists. The work can not help but stimulate the collection and study of mosses, in the botanical departments of our colleges and universities, and it should do somewhat to excite the interest of pupils in the high schools, academies and other secondary schools in which pupils pursue elementary botany. There is no good reason why students who are admitted to the Freshman classes of our colleges and universities should be wholly ignorant of the structure and relationship of the mosses, and this book (which may be obtained for one dollar) will be helpful to all teachers and pupils who wish to make an offort to know something of these interesting plants.—CHARLES E. BESSEY.

VEGETABLE PHYSIOLOGY.

What is Leuconostoc mesenteroides?—This organism was first described by Cienkowsky in 1878, under the name of *Ascococcus mesenteroides*. He obtained his material from beet sugar vats, and described the organism as consisting either of rods or coccus forms. The gelatinous clumpy masses had been familiar to sugar makers for a

long time, and often multiplied enormously in the beet juice, forming cart-loads of the so-called "frog spawn." In 1878 van Tieghem also studied the organism (*Ann. d. Sci. Nat. Bot.* Sé. 6. t. 7. p. 180), considered it to be closely related to Nostoc, and renamed it *Leuconostoc mesenteroides*. His observations contradicted those of Cienkowski in several important particulars. He found no rod-shaped bodies, but only a coccus, which, in exhausted material converted some of its members into spores, particular cells of the chain enlarging perceptibly, becoming more refractive, and taking on a thicker wall. His first material was discovered in the laboratory by accident in macerations of dates and carrots. Subsequently the organism thus found was compared with that from the beet sugar vats and found to be identical. In 1892, Liesenberg and Zopf published two papers which threw a flood of light on the subject (Zopf: Beiträge I and II). They first obtained the organism from the Spree River water, below certain breweries, starch factories, etc.. This form was subsequently compared with material from a beet sugar factory in Germany, and found to be identical. Their experiments covered a period of two years, and were carried along in two parallel series (1) with the European organism and (2) with material obtained from cane sugar vats in Java. The Javan and European form proved to be morphologically identical, and there were only a few very slight physiological differences. The organism as it comes from the vats is always contaminated with other bacteria, which stick to the gelatinous sheath. Pure cultures were therefore obtained with some difficulty, and only after it was discovered that the contaminating bacteria could be destroyed by heat without injury to the Leuconostoc. Poured plates made after exposing the finely rubbed mass in fluid to 75° C. for 15 minutes invariably yielded an abundance of pure colonies. The organism is plainly dimorphic. In solid or fluid nutrient media containing grape or cane sugar it multiplied in the ordinary gelatinous or cartilaginous, lumpy, frog spawn form. In similar media destitute of grape or cane sugar it grew in an entirely different form, i. e., as an ordinary, thin-walled Streptococcus. The two forms were so remarkably different both macroscopically and microscopically that the Streptococcus form was at first supposed to be some intruding organism; but repeated transfers of the two forms back and forth always gave the same results, i. e., the frog spawn form on nutrient media containing sugar, and the nude form on the same media when free from cane or grape sugar. The change from the nude to the covered form was followed in hanging drop cultures, and occurred in 12 to 24 hours. In nature the organism probably most often occurs in a form quite unlike that found

in the sugar vats. Transitions to the nude form were also observed in old sugar cultures, which had become acid from the growth of the organism. Moreover, the tough, shiny, elastic cartilaginous form developed on sugar media during the first week or two of growth was always observed to break down later on, becoming first flabby and then juicy soft. The nude form cannot be distinguished from Streptococcus; and both Migula and Lehmann and Neumann now write *Streptococcus mesenteroides*. Steamed potato proved excellent for the cultivation of the nude form. The cartilaginous form grew well on carrot. The organism is able to ferment the following carbohydrates with the formation of an acid: grape sugar, cane sugar, milk sugar, maltose, and dextrin. Glycerin is not fermented. It can produce its enormously thick envelope only from grape sugar or cane sugar after it has inverted it. The sheath is composed of a gum-like substance called dextran by Scheibler. It is incorrect to speak of a "dextran fermentation." There is no such thing. The sugars are fermented with production of an acid, but the dextran is as much a product of growth as cellulose. The acid formed from the grape and cane sugar (and presumably from the lactose and maltose) is lactic. This was identified by its calcium salt and zinc salt. Under ordinary conditions no appreciable gas was formed from any of these carbohydrates; but in the presence of calcium chlorid, or in the absence of oxygen, bubbles were given off (apparently CO_2). Calcium chlorid when added in 3–5 per cent. portions to properly prepared nutrient sugar solutions greatly favors the formation of dextran. Growth in such cases was very rapid, 101.5 grams of the Leuconostoc in one instance being developed out of 50 grams of cane sugar in four days. The organism is aerobic and also facultative anaerobic. It can invert cane sugar, but produces no peptonizing or diastatic ferments, and has no effect on cellulose. It is able to take both its N. and C. from peptone or from asparagin, but not from ammonium tartrate. In a 5 per cent. cane sugar solution containing the requisite inorganic salts no growth was obtained on adding ammonium tartrate, ammonium nitrate, or potassium nitrate, which would tend to show that it cannot take N. from these salts. The thermal relations are peculiar. Although a great variety of cultures in all stages of growth were examined for spores, nothing of the sort was found, and it is believed that no spores exist, certainly none of the sort described by van Tieghem. The organism is nevertheless very resistent to heat, even in the nude form. It grows at 9° to 11° C., but forms no acid. At 14° to 15° there is plain growth in 4 to 5 days with production of acid. Grows well at

21° to 23° C. Optimum 30° to 35° C. for the European form, and 30° to 37° C. for the Javan form. The maximum temperature for growth is 40° to 43° C. It cannot grow in juice kept at 43° C., but is not killed. The thermal death point of the frog spawn form is between 87° and 88° C. (five minutes exposure), and of the nude form only a little lower, i. e., between 83½° and 86½° C. It is thought that possibly the thick sheath may have a protective use, as dried and stone-hard specimens brought from Java were found to be alive at the end of 3½ years. A good contrast stain for the frog spawn form is dahlia followed by corallin.—ERWIN F. SMITH.

A New Disease of Tobacco Caused by Phytophthora nicotianæ.—This disease, described by Dr. J. v. Breda de Haan,[1] is most destructive to the seedlings while yet in the seed bed, but attacks older plants as well, extending its ravages under favorable conditions even to the curing barns. In this paper, published early in 1896, the author presents a very satisfactory account of the disease, and precedes the account by a general description of the location of the tobacco fields in the Dutch East Indies. The relations of soil and climate to the parasite are fully pointed out, as are the methods of culture both of the seedlings and of the mature plant.

The disease is, so far as he has been able to determine, confined to the Dutch East Indies. It has probably caused some damage for many years, but was first generally recognized in 1889. In 1893 it was very destructive, owing to the wetness of the season.

The hyphæ of P. nicotianæ enter the leaf by the stomata, and ramify principally in the intercellular spaces. They also pass through the cells, and sometimes fill them with a net-work of hyphæ.

Usually only the haustoria enter the cells. The haustoria are simple unbranched hyphæ, which end freely in the cell.

The mycelium is normally unicellular; but when it is torn, or when the protoplasm is contracted, on account of unfavorable external conditions, the cell contents are separated from the empty part of the mycelium by thin cross walls.

The contents are granular, with scarcely any oil drops, and stain readily with an aniline blue. The hyphæ are about 5 mic. mill. thick, and when free to do so grow long and scarcely branched. Sometimes they may be seen reaching from one seedling to another, looking like delicate threads.

[1] (De. Bibitziekte in de Deli-Tabak veroorzacht door Phytophthora nicotianæ. *Mededeelingen uit's Lands Plantentuin*, Number XV, 1896.)

The spread of the disease is greatly facilitated by the method of growing the seedlings ("bibit"). Several beds are prepared one after another, so that the series contains seedlings of all ages. These are separated by narrow walks, and are themselves narrow enough to permit the coolie to reach all parts of the bed.

In his search for worms or insects the coolie touches diseased and healthy plants, transferring the fungus from one to the other. He also carries the germs about on his clothing or tools and watering pot. The mature plants often show the disease on the tips of the leaves, where persons have brushed against them in passing. The parasite also spreads over the ground, growing from bed to bed across the narrow walks.

In one case only was the agency of wind as good as proven. In this case the center of infection lay to the windward of the later attacked beds, and the beds not in the path of the wind were not attacked.

Conidia are produced in abundance. The conidiophores usually pass out through the stomata, but may push up through the epidermis. At the end a pear-shaped (ob-pyriform as shown in the figures) conidium, 36 x 25 mic. mil. in size is formed, and when ripe is cut off from the conidiophore by a cross wall.

A second conidium is sometimes developed from the side of the first one, and remains connected to it by a short hypha. The contents of the first conidium pass into the second one, in which the swarm spores are developed. The development of the swarm spores requires about 20–30 minutes, at the end of which time the "slime plug" at the apex of the conidium dissolves and they emerge. The number observed in a conidium varied from 10 to 15.

Each swarm spore has one flagellum, and may have another, but of this the author is uncertain. The swarm spores may give rise to secondary conidia. Two cases were observed, but in neither case was the development of swarm spores seen. In the first case the conidium was developed three days after the liberation of the swarm spore in a hanging drop water culture. It remained in the same condition a few days and then perished. In the second case the conidium was found open at the end of four days and the contents gone. No mention is made of swarm spores in the surrounding medium.

Sexual reproduction takes place by means of oogonia and antheridia. The antheridium may arise from the same hypha as that on which the oogonium is borne, or on a different one. The contents of the antheridium are emptied into the oogonium, after which the oospore forms a wall about itself. The process is in all respects the same as that in other

Peronosporaceæ, except that so far as could be ascertained all the contents of the antheridium pass over into the oogonium. This is a departure from the usual course for Phytophthora, in which, according to de Bary (1881) and also Strasburger (Lehrbuch der Botanik, 1894) only a part of the contents pass over.

Phytophthora nicotianæ has the omnivorous habit of P. cactorum C. & L. (P. omnivora de Bary), attacking species of Amaranthus and seedlings of Androng as well as tobacco. The habit of the conidiophores also resembles this species especially in the absence of the swellings under the conidium so characteristic of P. infestans. It differs, however, from P. omnivora in the size of the conidia, which are 50, 60 or 90 mic. mil. long by 35 or 40 mic. mil. wide in P. omnivora, and only 36 x 25 in P. nicotianæ. The size of the conidia brings it closer to P. phaseoli Thaxter in which they are 35–50 x 20–25 mic. mil. in size. The biological identity not having been established the author decides to call the present species P. nicotianæ sp. nov.

The first symptom of the disease is a wrinkling of the edge of the leaf accompanied by wilting, and, if the petiole is attacked, drooping of the leaf. When the attack is severe the seedlings soon change to a dark green slimy mass, covering the surface of the bed. The appearance presented is as though boiling water had been thrown over the bed. On older seedlings and mature plants the disease appears in spots on the leaves. These are at first not well defined, and have a dark center with indefinite circumference; later, the center dries up and becomes translucent, or if on older leaves, brown, and a dark green border separates it from the healthy portions of the leaves. The disease also attacks the seedlings near the ground, causing damp off. Mature plants sometimes show the disease in this form; but it is nearly always due to using diseased seedlings for transplanting.

The account of the artificial cultures is unfortunately lacking in definiteness.

The author made cultures in various strengths of cane sugar solution, 5, 10 and 15 per cent., in prune juice, in a decoction of tobacco ashes in water, on sterilized potato slices, on agar-agar mixed with peptone-gelatine and tobacco water, and on slices of banana. All failed, except those in 5 per cent. sugar water and on sterilized potato. These gave fairly good results for a few days, but subsequently also died. The author does not state whether his sugar solution contained any nitrogenous matter, nor whether distilled water was used in making it, but leaves it to be inferred that such was not the case.

Mycelium forming oogonia was brought into a 5 per cent. solution of cane sugar, in which it grew for a few days and produced many fructifications. After six days it remained stationary. The cultures in 15 per cent. sugar solution were poor, and developed what seemed to be a yeast form. Conidia-forming mycelium was also grown in a 5 per cent. sugar solution, and produced for a few days many conidia, the swarm spores of which germinated with long germ tubes.

Agar-agar was mixed with peptone gelatin and leaf decoction (tobacco presumably) in "various ways," but without success. Author does not give the different proportions.

Some mycelium was put on the surface of sterilized potato slices, on which it grew fairly well. The tissue penetrated by the fungus turned red, the starch disappeared, and the cell walls became mucilaginous. The fungus grew intra-cellular, but died after a few days. This culture succeeded best when kept in the dark. The author does not state whether the potato was sterilized by steam or by chemicals.

The relations of the parasite to drying and to darkness were studied. Darkness was found to be generally advantageous to it.

The mycelium and conidia are unable to withstand the least drying. The oospores, however, are more resistant, but succumb to constant drying for 14 days, or when the leaves containing them were subjected to a hot sun bath for five hours on two successive days.

Extensive experiments were conducted in order to combat the disease. It was found that by the free admission of light and air to the seed beds, together with liberal spraying with Bordeaux mixture every five days, or after heavy rains and during damp weather, the fungus could be held in check. Where such measures were taken the tobacco beds were comparatively free from the disease.—A. J. Pieters.

ZOOLOGY.

On the Occurrence of Filaroides mustelarum van Ben. in American Skunks.—Through the kindness of Mr. Gerrit S. Miller, Jr., I have recently had the opportunity of examining a skull of the common skunk (*Mephitis mephitica*) from North Bay, Ontario, the frontal bones of which each exhibited, close to the sagittal plane, a prominent swelling over which the bony tissue was so attenuated as to be easily crushed by the finger. The specimen was still in the flesh, and was preserved in formalin. Mr. Miller tells me that he finds these

frontal enlargements in a large percentage of the skulls of both *Mephitis* and *Spilogale* from all localities. Merriam (Revision of the Genus Spilogale, N. A. Fauna, No. 4, p. 3, 1890) speaks of "large asymmetrical postorbital swellings resulting from the presence, in the frontal sinuses, of a worm-like endoparasitic arachnid of the genus *Pentastoma*," and on p. 4 of the same work, refers to "the large swellings produced by the worm-like parasite (*Pentastoma* or *Linguatula*) which infests the frontal sinuses of more than half the skulls examined." Bangs, in a Review of the Weasels of Eastern North America (Proc. Biol. Soc. Washington, Vol. X, p. 1, 1896) speaks of "the parasite that attacks the frontal sinuses of these animals as well as those of their relatives the skunks, mink, and otter." *Putorius noveboracensis* he says "suffers so much that it is hard to get perfect skulls." See also the figures of skulls in Merriam's Synopsis of the Weasels of North America (N. A. Fauna, No. 11, 1896).

The swellings in the frontal bones of the specimen of *Mephitis* submitted to me are caused by a nematode worm which in every particular agrees with *Filaroides mustelarum* van Beneden (Mém. s. l. Vers Intestinaux, p. 267, 1861), and I have no hesitancy in ascribing it to that species. Each of the swellings contained a nest of at least fifteen to twenty of the worms. The parasite is common in Europe, occurring in the air-passages of several species of Martins and Weasels. It has been described and figured in the frontal sinuses of *Mustela* by Weijenbergh (Arch. Néerlandaises, Tom. III, p. 428, 1868), and von Linstow (Arch. Naturg, Jahrg. 39, Bd. I, p. 300, 1873) has described it from the ethmoid and frontal bones of *Mustela* and *Putorius*. The parasite is always, directly or indirectly, connected with the respiratory system.

The object of this note is to call attention of the occurrence of *Filaroides mustelarum* in America, and to show that, without doubt, the swellings so common in the skulls of American skunks are caused by the presence of this nematode in the frontal sinuses; and that the prevalent frontal enlargements of other American Mustelidæ are probably due to the same parasite.—W. McM. Woodworth.

Museum of Comparative Zöology,
Cambridge, Mass., Jan. 21, 1897.

A Peculiar Appendage on the Thelycum of Penæus.[1]—A short preliminary note by Dr. Kishinouye undertakes to show that the leaf-like structure first described by Spence Bate in the Challenger report on the Macrura as an appendage of the secondary sexual organ

[1] The Zoological Magazine, Tokio, VIII, 59.

of *Penæus* is not formed on the animal that bears it, but in the dilated end of the ductus ejaculatorius as a secretion, and that probably it is carried over to the female during copulation. It has no cellular structure whatever, and is found in a rolled-up condition in the ducts of the males.

It was described by Spence in the Japanese variety of *P. canaliculatus*, and is to be found, though not so conspicuously, in *P. semisulcatus*, *P. curvirostris*, *P. monocerus?* and *P.* sp.— (The Japanese *mayebi*). Dr. Kishinouye's observations were made chiefly upon *P. canaliculatus* and *P. monoceros?*—F. C. K.

Nerve-endings in the rennet glands of the Vertebrate Stomach.[1]—The nerves spreading out over the serous membrane of the vertebrate stomach arise from the plexus of Meisner and form two other plexi—one under the rennet glands, the other below the ephithelium of the stomach. The simple nerve fibers form a plexus about the membrana propria of the glands and now and then pierce it, spreading their fine branches out around the cells. Each branch ends in a varicosity, but does not penetrate the cell as supposed by Nawalichin and some others. In this conclusion Dr. Kytmanow, the author of the paper cited, is in agreement with Erich Mueller, Smirnow, Arestein and others who have studied the peripheral or epithelial terminations of nerve fibers. His study upon the stomach of the cat was undertaken to determine surely what Erich Mueller had left as uncertain, namely, whether the fibers terminate inter- or intra-cellularly. For this he employed the Golgi, methylen blue and gold chloride methods. With the first he was unsuccessful, but with the other two, especially with the methylen blue, he arrived at the conclusion that has been given.—F. C. KENYON.

The Breeding Haunts of Ross' Gull.—One of the valuable ornithological facts that the "Hero of the White North," Nansen, has to relate, is that he has discovered the breeding station of the circumpolar gull, *Rhodostethia rosea* Macy. The small group of islands which he calls the Hirtenland group, where he found the birds in large numbers and breeding, lie in 81° 38′ N. Lat. and 63° E. Long. They seem to occupy a position within an area laid down by Payer as Wilczek land.

Proper name for the Western Horned Owl of North America.—In the "*Auk*" for April, 1896, p. 153 I published a revi-

[1] Intern. Monatsch. Anat. Phys., XIII, 402–5.

sion of North American Horned Owls in which I showed that the name *subarcticus* Hoy. was a synonym of *arcticus* Swains, and hence untenable for the light colored *Bubo* of the western states.

In the same paper I proposed to recognize the small Bubo of southern California as a distinct subspecies under the name *pacificus* Cassin.

For the old "*subarcticus*" I proposed the name *occidentalis* and selected for my type a specimen from Mitchell Co., Iowa (No. 26435, Coll. Acad. Nat. Sciences, Phila.) which showed the greatest contrast to the small Californian race.

This specimen, however, unfortunately proves to be intermediate between *B. virginianus* and *arcticus* and does not belong to the race which I had intended to rename; the latter not extending so far east (See Auk., Jan., 1897, p. 132.)

Such being, the case my name "*occidentalis*" must be relegated to synonymy and I would propose for the Horned Owl of the interior United States (the "*subarcticus*" of authors, nec. Hoy) the name *pallescens*, designating as the type, No. 152219, Coll. U. S. Nat. Mus. ♂ Watson Ranch, 18 mi. S. W. of San Antonio, Texas.

Bubo virginianus pallescens is smaller and paler than the true *virginianus* (the wing measuring 13.75 in.) with much less rufous admixture. The barring on the belly is much finer and the feet almost pure white.

While not differing so much in size from *B. v. pacificus* as indicated in my former paper (Auk., 1896, p, 156), its coloration is quite distinct. The latter race is darker than *pallescens* with more black admixture above, heavier bars on the belly and with the feet more mottled with rufous and brown.

In entering *Bubo virginianus pacificus* Cass. in the Supplement to their Check List the American Ornithologists' Union Committee have added to the confusion by giving it the same number as has already been given to *B. v. saturatus.*

The various races of our Horned Owls should now stand as follows in the A. O. U. List:

375. *Bubo virginianus* (Gmelin). Great Horned Owl.
375a. *Bubo virginianus pallescens* Stone. Western Horned Owl.
375b. *Bubo virginianns arcticus* (Swainson). Arctic Horned Owl.
375c. *Bubo virginianus saturatus* Ridgway. Dusky Horned Owl.
375d. *Bubo virginianus pacificus* Cassin. Pacific Horned Owl.

—WITMER STONE, *Acad. Nat. Sci., Phila.*

An Incomplete List of the Mammals of Bertie Co., N. C.—During the years 1891, 1892 and 1893 we received a number of small

mammals in the meat and in alcohol, from Bertie Co., N. C. The specimens came from that part of the county which lies a few miles west of the shore of Albemarle Sound, and about midway between the Tar and Chowan Rivers. Nothing larger than a Flying Squirrel was sent, hence the list is by no means a complete one, though it contains several records of interest. The following were the species obtained:

1. *Microtus pinetorum.*—One specimen, Jan. 22, 1891, and three in July, 1891. (*Microtus pennsylvanicus*, one of our commonest mice at Raleigh, was not obtained at all.)

2. *Peromyscus leucopus.*—Twenty-one specimens were received of this species, showing it to be the predominant Deer Mouse of the locality as against the next.

3. *Peromyscus gossypinus.*—Four specimens of this species were secured, one being in the bluish pelage of the young.

4. *Peromyscus aureolus.*—Thirty-seven specimens. The larger number received of this arboreal species was due to the ease with which they can be caught in their nests, when one once knows just where to look for the said nests.

5. *Reithrodontomys lecontei.*—Ten specimens of the Harvest Mouse were received. Like *P. leucopus* and *P. gossypinus* they were mostly caught in traps.

6. *Sciuropterus volans.*—Four adults and three young of the Flying Squirrel were received.

7. *Putorius noveboracensis.*—Two young Weasels, a male 265 mm. in total length, and a female 234 mm., were the only carnivora contained in the collection. Date of capture, May 16, 1892.

8. *Scalops aquaticus.*—Four specimens of the Common Mole were taken July 9, 1891; March 24 and April 22, 1892, and March 18, 1893.

9. *Blarina parva.*—Twelve specimens were dug out of an old stump on Jan. 21, 1892, and four others were also secured.

10. *Sorex longirostris.*—One specimen, collected June 13, 1892.

11. *Atalapha borealis.*—Thirty-six specimens of the Red Bat were obtained. This and the next are evidently the common bats of the locality.

12. *A. cinerea.*—Three specimens of the Hoary Bat were collected, one each on Oct. 10 and Nov. 1, 1892, and April 8, 1893.

13. *Nycticejus humeralis.*—Sixty-one specimens. Of twenty-seven specimens caught roosting in an old house on June 18 and July 1, 1891, all were females.

14. *Vesperugo carolinensis.*—Of this bat, one of the commonest at Raleigh, only six specimens were received.

15. *Adelonycteris fusca.*—Three specimens of the Large Brown Bat were secured, taken on Aug. 17, 1891, and March 7 and Nov. 9, 1893.

16. *Lasionycteris noctivagans.*—Six specimens of the Silver Black Bat were taken, four on July 1, 1891, and two (caught in a hollow tree) Dec. 26, 1892.

17. *Vespertilio lucifugus.*—Three specimens of the Little Brown Bat were taken, one each on July 9, 1891, Aug. 3, 1892, and July 17, 1893.

18. *Plecotus macrotus.*—Big-eared Bat. One specimen was taken on Feb. 1, 1893, and two on Oct. 24, 1894. This bat and *Atalapha cinerea* have also been taken at Weaverville, in the western part of the State, but not as yet here at Raleigh. The specimens were furnished to us by Messrs. Thos. A. Smithwick, of Walke, and J. W. P. Smithwick, of Sans Souci.—C. S. BRIMLEY.

Preliminary Description of a New Race of the Eastern Vole from Nova Scotia.—There is in Nova Scotia a small, bright-colored vole with small hands and slender feet that seems subspecifically distinct from the large dark-colored southern *Microtus pennsylvanicus typicus.*

It lives in great numbers in the fields and fresh water marshes, but especially in the glade-like openings in the spruce forest, where little spring brooks run down through the beds of rushes (*Juncus* sp.) among which its runways can be seen in all directions.

The new form, based on a series of sixty-three specimens, may be characterized as follows:

MICROTUS PENNSYLVANICUS ACADICUS subsp. nov. *Type* from Digby, Nova Scotia, No. 2155 ♀ old adult, Coll. of E. A. and O. Bangs. Collected by O. Bangs, July 22, 1894. Total length 172, tail vertebræ 49, hind-foot 20.

General Characters.—Size smaller than *M. pennsylvanicus typicus;* hands very small; feet slender; colors bright; skull smaller than that of *M. pennsylvanicus typicus* and lighter throughout; incisor teeth much more slender.

Color in winter pelage, upper parts bistre-brown, somewhat shaded with russet, with very few black-tipped hairs intermixed; under parts dark gray, often washed with buffy.

In summer pelage, upper parts with russet the predominating color. (At this season *M. pennsylvanicus acadicus* is much paler and brighter colored than *M. pennsylvanicus typicus.*)

Cranial Characters.—Skull smaller than that of *M. pennsylvanicus typicus* and lighter throughout; pattern of enamel folding of molar teeth similar; incisor teeth much more slender.

Size of skull (average measurements of ten old adult topotypes).—Basilar length 23.9, Basilar length of Hensel, 22.8, zygomatic breadth 14.7, mastoid breadth 11.8, greatest length of single half of mandible 15.6.

Size.—Average measurements of fifteen old adult specimens, males and females, from Digby, Nova Scotia, total length 167, tail vertebræ 45, hind-foot 20.3.

Remarks.—Compared with *Microtus frontigenus*, *M. pennsylvanicus acadicus* is larger and much more brightly colored, and has smaller audital bullæ.—OUTRAM BANGS.

A New Race of Gibb's Mole.—In his recently published Revision of the American Moles,[2] Mr. F. W. True treats Gibb's Mole, *Neürotrichus gibbsi* (Baird), from the whole coastal strip from British Columbia to San Francisco Bay as one form, although he points out the fact that Southern examples are larger than Northern ones. I have long considered the species to be made up of two well-defined and easily recognized races, for the Southern one of which I now propose the name:

NEÜROTRICHUS GIBBSI HYACINTHINUS subsp. nov. *Type* from Nicasio, Marin Co., Cal., ♀ old adult, No. 1240, Coll. of E. A. and O. Bangs. Collected by C. A. Allen, March 10, 1894. Total length 127, tail vertebræ 41.4, hind-foot 17.5.

General Characters.—Size considerably larger than *N. gibbsi typicus;* color uniform black, instead of deep brownish-plumbeous as in *N. gibbsi typicus;* skull larger and relatively broader.

Color.—Black all over, with in places green and purple irridescence; under fur black.

Cranial Characters.—Skull larger and relatively broader than that of *N. gibbsi typicus.*

Size of the type skull, Basilar length (basion to front of premaxilla) 19.8, mastoid breadth 11.4. (One of the largest skulls of *N. gibbsi typicus*, from a series of eighteen from Sumas, B. C., No. 5513, Bangs Coll., measures: Basilar lengih 18.4, mastoid breadth 10.2.)

Size.—Average measurements of two adult specimens from the type locality: total length 123.8, tail vertebræ 39.7, hind-foot 17. (The average measurements of the ten largest adult specimens of *N. gibbsi typicus*, from a series of eighteen from Sumas, B. C., are: total length 116.4, tail vertebræ 38.4, hind-foot 17.4.)

Remarks.—I am unable to say just where the two races of Gibb's Mole meet; but the San Francisco Bay specimens are very different

[2] Proceedings U. S. Nat. Mus., Vol. XIX, No. 1101.

from the British Columbia ones, and well warrant dividing the species into a small plumbeous Northern and a large black Southern race.

In the summer of 1896, Mr. Allan C. Brooks took a series of *N. gibbsi typicus* on Mount Baker, at the very edge of the perennial snow. He

FIG. 1.

Fig. 1. *Neürotrichus gibbsi typicus* (No. 5513, Bangs Coll.) x ⅔.

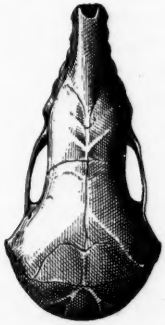

FIG. 2.

Fig. 2. *Neürotrichus gibbsi hyacinthinus* (Type) x ⅔.

says these specimens do not differ in any way from those taken in the lowlands about Sumas, B. C.—OUTRAM BANGS.

Zoological News. PROTOZOA.—Among the Protozoa described by Dr. C. A. Kofoid for the Traverse Bay region of Lake Michigan[3] there are 22 Rhizopoda, 5 Heliozoa, 20 Mastigophora, and 34 Infusoria. The close correspondence between the European aud the American Protozoan fauna is shown in the fact that out of the 81 species that he lists 73 are also found in Europe. With two exceptions, *Podophrya cyclopum* and *Glenodinium cinctum*, every one of those that he records as limnetic species (i. e., those found in open water) are also found at Plön, as recorded by Zacharias.

TURBELLARIA.—Two new species of Turbellaria are described as *Phonaria simplex* and *Mesostomia wardii* respectively in Bulletin No. 6 of the Michigan Fish Commission.

ROTATORIA.—In the same Bulletin, H. S. Jennings describes a new rotifer, *Distyla signifera*.

MOLLUSCA.—In a list of the mollusks of Tennessee,[4] embracing 71 species of Pelecypoda, 41 being aquatic and 54 terrestrial Gasteropoda,

[3] Bull. 6, Mich. Fish. Com.

[4] Contributions to the Zoology of Tennessee, No. 4, Mollusks. H. A. Pilsbry and S. N. Rhoads. Proc. Phil. Acad. Sci., 1896, p. 499.

I note the description of one new species, *Anculosa harpethensis* Pilsbry. It is distinguished from *A. subglobosa* Say. by its globular form and the angulation at the base of the columella; "face of columella concave, a projecting angle at union of columellar and basal lips."

MAMMALIA.—The mammals collected by Dr. A. Donaldson Smith during his expedition to Lake Rudolf, Africa, representing 50 genera and 77 species, 7 of which are new, have been described in the Proceedings of the Academy of Natural Science of Philadelphia (pp. 517–546) by Mr. S. N. Rhoads.

EMBRYOLOGY.[1]

Spinning Powers of Certain Eggs.—It is well known that the protoplasm of many one-celled animals may flow out as excessively delicate threads of living matter that exhibit remarkable currents and contractile phenomena. Something similar to these filose "pseudopodia" is met with in certain cells of many-celled animals, as in the pigment cells of the retina, etc. In a recent paper by Gwendolen Foulke Andrews[2] it is claimed that the eggs of star-fish and sea-urchins form very much the same sort of delicate pseudopodial filaments as are produced in those one-celled animals.

These thread-like processes are "spun" out from the protoplasm of the egg in such exceedingly delicate filaments that they have escaped notice and have now been revealed only with good lenses and exceptional optic resources.

From the elevation of the egg's surface that meets the sperm a "*tuft*" of fine threads is spun out; the whole surface of the eggs spins out fine threads to make the egg membrane; the egg spins during cleavage; it spins out the cilia that move the blastula; it spins filaments across the cleavage cavity and from one germ-layer to another in the gastrula; and the polar bodies spin like the rest of the egg.

These threads spun out are flowing material that branches, anastomoses, shows currents and other phenomena very much as do the pseudopodial filaments of such one-celled animals as Gromia.

[1] Edited by E. A. Andrews, Baltimore, Md., to whom abstracts, reviews and preliminary notes may be sent.

[2] Journal of Morphology. February, 1897, pps. 367–389.

The membrane that is formed after entrance of a sperm is made in the sea-urchin by the following spinning phenomena. In normal eggs of Echinus clear, homogeneous, straight, smooth filaments flow out from the egg, very close together, and all attain the same length about the same time. These filaments then seem to fuse at the tips to make a ceiling-like film that grows thicker. The space between the filaments is then filled in—in some undetermined way—and thus the membrane is completed.

In abnormal eggs the spinning is irregular and more in the form of tufts and brushes that are more readily observed.

In the star-fish after such a membrane is formed the egg sends out a tuft of threads from the place where the polar bodies were formed and then ceases to spin; soon the general surface spins again and continues to do so during cleavage. These filaments branch and anatomose; they may bend suddenly at the base and even bend over at right angles at some point in their course; they may start from the surface of the egg at various angles even tangentially; they may run out and attach themselves to the egg membrane.

When cleavage of the egg begins, the spinnings show peculiar activity near the plane where the cells will separate. As the cleavage furrow is formed threads spin from one side to the other so that the two cells are connected by cross filaments as fast as they are separated by the plane of cleavage. The liquid between the cells is crossed by many most delicate strands and skeins of filaments that connect the two cells.

When the two cells subsequently approach and flatten against one-another the connecting strands shorten and thicken as if contracting to draw the cells together. When pressure is applied to such cells the connecting threads appear as if resisting separation of the cells and as if more active in drawing them together.

Later when more cells are formed the same phenomena are seen and when the cleavage cavity is present it is crossed by a network of interlaced filaments spun out from the inner ends of the cells. These filaments connect adjacent cells and also the most remote cells of the blastula.

When the blastula is ready to swim, the external spinnings cease for a while and then start again as numerous processes from the general pellicle all becoming very long and active as the well known "cilia" that propel the blastula through the water.

In the gastrula stage both entoderm cells and ectoderm cells spin filaments that cross the blastocœle and connect all the cells. When the mesenchyme cells are formed they too spin many filaments that connect

with the other cells and with other filaments so that the blastocœle is traversed by a very complex network of anastomosing filaments arising from all the germ layers. These internal spinnings remain active up to the time of formation of the proctodæum, at least.

The polar bodies spin, from the first, very fine pseudopodial filaments that soon unite with the egg and with the egg membrane as well as with filaments from the egg so that the polar bodies are henceforth (up to the period of the late gastrula, at least) united to the egg, and to the resulting cells, by threads of living material.

The shape of the polar bodies may be changed as if distorted by contraction of these filaments; and change of place of the polar bodies seems also to be due, at times, to contraction of the filaments.

In the anastomosing network that connects the egg with the polar bodies material is carried hither and thither in the currents that flow along the threads.

Eventually the polar bodies may be taken in to the blastula, through the cleavage pore, and henceforth be connected with the network spun out from the inner ends of the blastula cells and, later, with the filaments from the entoderm cells of the gastrula also.

The natural criticism that these spinning phenomena are abnormal, pathological, and hence of less wide interest, is met by the author with the statement that every precaution was taken to maintain normal conditions and that the eggs described were from lots that formed normal larvæ, or even themselves grew into normal larvæ after the observations. Moreover it is granted that heat, polyspermy, immaturity of the egg and adverse states of the water resulted in very profuse spinning phenomena, but these truly pathological phenomena were very different in character and easily distinguished from the less obvious phenomena believed to be undoubtedly normal.

It is thus claimed that in these normal Echinoderm eggs the protoplasm can project delicate living filaments. That these are concerned in the formation of the egg membrane. That they connect the cells during cleavage and gastrulation so that *the protoplasm is continuous throughout the larva and not separated by the cell walls.*

As appearances indicate that these connecting filaments are contractile and that they aid in drawing the cells together, they may thus prove to be the basis of the so-called "cyto-tropic" movements exhibited by the blastomeres of various eggs.

Moreover as these filaments are living bands and as material passes along them from one cell to another, the author thinks they may prove to be the means of that coordinating communication in the cell-aggre-

gate postulated by certain workers in the field of experimental embryology.

The polar bodies are said to spin like the cells of the egg for a long time after their formation and to remain so long in protoplasmic continuity with the other cells that there is a possibility they may not be entirely without a place in the developmental changes.

The peculiar activities of the protoplasm of these eggs together with many general questions connected with such phenomena will be considered in a second paper, now in press.

Though these remarkable phenomena are new to our knowledge of eggs the reviewer would suggest that what is here seen as living filaments may have appeared to other observers as a protoplasmic envelope on the outside of the egg. Thus it may be that the very thick covering "*Protoplasma mantel*" figured and described by Selenka[3] in the Ophuirid *Ophioglypha lacertosa* and the much thinner "*Protoplasma schicht*" in the Echinid *Strongylocentrotus lividus*, which also enters the cleavage cavity, are really a collection of spinnings, possibly somewhat pathological. In the last named case this outer envelope of the egg has recently been emphasized by Hammar[4] as a connection between the cells.

PHYSIOLOGY.

The action of the venom of the Australian Black Snake.—From numerous experiments detailed in a lengthy paper in the Journal and Proceedings of the Royal Society of New South Wales[1] C. J. Martin concludes briefly that the venom of the Australian black snake (*Pseudechis porphyriacus*) is comprehensive in its action, but affects principally the three most vulnerable points of the higher organism, namely, the blood, heart, and the respiratory center in the medulla. Its method of destroying life depends essentially upon the concentration with which the venom reaches the circulation. When the concentration reaches a certain limit, death may be almost instantaneous from a coagulation of the blood, thus ending circulation. If the concentration falls short of this the venom has the opposite effect of destroying the capacity of the blood to clot when shed. When this is the case any

[3] Studien über Ent. Hft. 2. Wiesbaden, 1883.
[4] Archiv. f. Mik. Anat. March, 1896.
[1] XXIX (1896), pp. 146–278.

further injection of the venom fails to cause clotting within the vessels (thrombosis.)

The action of the poison upon the heart and respiratory center is usually simultaneous. With the higher concentration it is the heart that fails first, with the lower concentration, it is respiration. Hence according to the concentration of the dose death may occur in from one to three days from clotting of the blood within the vessels, from cardiac failure, or from respiratory paralysis.

If the animal succeeds in passing these three possibilities it may yet succumb from secondary pathological changes in the lungs and kidneys. This last is not, however, a large risk, except in dogs, and if the animal survives the nervous and circulatory depression it usually recovers with wonderful rapidity.

The animals experimented upon were frogs, turtles, pigeons, rabbits, cats, dogs, and for man, upon his own blood. From the details that he records it is interesting to note that the venom destroys the red blood corpuscles, causing the hæmoglobin to dissolve out into the serum and escape through the kidneys in a crystalline form. In blood observed beneath the microscope the red corpuscles swell up to spherical masses, become transparent and finally disappear. All amæboid action in the white corpuscles is stopped. They finally become very granular, the nucleus appears distinctly as when the corpuscles are treated with acetic acid. Finally they are destroyed.

One very noticeable feature is that in common with other venom that of *Pseudechis* at first causes a scarcity of the white corpuscles; then this condition is followed by one in which they are more than normally present.

The action of the venom upon the dog is about ten times greater weight for weight, than upon any other animal. He says that the lowest limit of concentration necessary to produce the destruction of the blood corpuscles either within the body or *in vitro* is for dogs .00001 grammes of the venom to 100 c. c. of blood. The corpuscles of rabbits, guinea-pigs, cats, and white rats are much less easily destroyed. A concentration of .005 per cent. produced no destruction of the corpuscles of his own blood.

The blood plasmas that have lost all spontaneous coagulability may be coagulated by, (1) the addition of a saturated NaCl solution up to an equal volume, (2) the addition of an equal volume of a saturated solution of $MgSO_4$, (3) the addition of acetic acid until there is a slight evidence of acidity of the plasma, and (4) by the similar addition

of sulphuric, hydrochloric, or phosphoric acid (Oxalic acid is ineffectual).

Very much larger amounts of the venom may be injected subcutaneously without producing the effects that follow intravenous injections. In this case the author thinks that the blood acquires an immunity to further doses. How long this immunity may last, however, he is not able to say.

The blood pressure (arterial) in the case of intravenous injections gradually falls until death. In the case of subcutaneous injections it falls for a while, then rises to near the normal and again falls until the death of the animal.

With this change in the blood pressure there is a corresponding change in the volume of the spleen and kidneys, both increasing in volume with the fall of blood pressure and decreasing with its rise.

The venom lessens the power of the blood to carry CO_2 and decreases the toxic powers of the serum over micro-organisms.

Heating to 85°C. lessens the power of the venom to destroy blood corpuscles and also its toxic qualities generally. This may be explained by the heat converting some of the proteids of the venom into an inert precipitate and secondly by its causing some change in their toxic power without, however, impairing their solubility or changing them in any may recognizable by chemical means.

Upon the nervous system the venom does not, as has been recorded for that of other snakes, have a curare-like action, but like them it causes a general paralysis, beginning with the lower and passing successively to the higher centers. Dogs poisoned with *Pseudechis* venom loose first the use of their hinder limbs.

There is no increase of respiration followed by a decrease as has been noted in other experiments, but instead a gradual decrease in both the amplitude and the number of respirations coinciding with the fall of blood pressure, except where the venom reaches the blood indirectly as in subcutaneous injections or through serous surfaces. In such cases there is a tendency to return to the normal.

The effect upon body temperature is such as to cause a rise or a fall in temperature according to the manner in which the venom reaches the blood, if this be slowly, it may cause a rise, if rapidily, a fall. As in the case of *Crotalus* venom as found by Sewall in animals more or less immunized by repeated small injections, a lethal dose may be followed by a rise in temperature.

Among the other pathological effects may be noted that it causes hæmorrhages in all of the organs of the body and from the mucous sur-

faces. Hæmorrhages are especially to be noted in the lungs. The urine of animals poisoned by *Pseudechis* always contains albumen, sometimes hæmoglobin, and frequently blood.

An idea of the toxic value of the venom may be obtained by comparing it with other poisons, basing the comparison upon the number of grammes of an animal, viz., a rabbit, killed by one gramme of the venom injected subcutaneously.

Cobra	4,000,000.
Hoplocephalus curtus . .	4,000,000.
Pseudechis	2,000,000.
Diptheria toxine . . .	4,000,000 (about.)
Anthrax albuminoses . . .	80.
Toxo-peptone	3,000.

—F. C. KENYON.

PSYCHOLOGY.[1]

The Year 1896 in Scientific Psychology.—While the past year has shown no startling developments in psychology, it has been marked by steady progress and an unusual amount of activity. The experimental laboratories everywhere have been busy, and a large number of Laboratory Studies have been published.

In this country the activity has been especially marked; the *Psychological Review* and the *American Journal of Psychology* have devoted more than usual of their space to experimental work. The psychological department of Cornell University has moved into larger quarters in Morrill Hall, where it is reported to have nine rooms and 4,000 square feet of space. The laboratory at the University of Nebraska has moved into the new library building, and occupies a series of five rooms and 3,000 square feet of space. A laboratory of experimental psychology has been fitted up during the year at the University of Kansas, under the charge of Prof. Olin Templin. The University of Chicago and Columbia University are preparing to establish their laboratories in ampler quarters, when the new buildings are completed.

In Russia it is reported that the Universities of St. Petersburg, Moscow and Kieff have taken steps, in connection with the Minister of Education, looking to the establishment of psychological laboratories. The University of Kieff has petitioned for an appropriation of about

[1] Edited by H. C. Warren, Princeton University, Princeton, N. J.

$3,000 to equip such a laboratory, and a yearly sum of $300 to maintain it. In addition to the older magazine, *Voprosi Philosophi i Psichologi*, which has always published a large number of psychological articles, a new Russian magazine has been started by Prof. A. A. Tokarsky, entitled *Zapiski Psichologetscheskoi Laboratori;* it is to be published quarterly as organ of the Psychiatrical Clinic at Moscow. Dr. W. von Bechterew has also established a new Review of Psychiatry, Nenrology and Experimental Psychology, to be published monthly at St. Petersburg.

In Germany a new psychological "Archiv" has been started by Prof. Götz Martius, under the title of *Beiträge zur Psychologie und Philosophie*, as organ of the laboratory at the University of Bonn. Like the *Psychologische Arbeiten*, established a year ago by Prof. Kraepelin at Heidelberg, it is to be devoted chiefly to laboratory studies, and will appear at irregular intervals. We note also the unusual activity of the *Zeitschrift für Psychologie*, which during the past year issued three complete volumes and over, without any apparent falling off in the standard of its contents.

In France, the *Année psychologique* has been very much enlarged, and includes a number of original articles—partly from the Paris Laboratory—as well as summaries of all important books and articles in all languages that appeared during the preceding year.

The increase of general interest in psychology has shown itself in the unusual number of articles on the subject that have appeared in the popular magazines and those devoted to various departments of science. The number of books, pamphlets and articles of more especial interest to the psychological "Fachmann" has also been remarkably large, as appears from the increased number of titles in the forth-coming *Psychological Index*. The bibliography of the *Anné psychologique* has joined forces with the latter annual, which is now issued in both English and French. The bibliography of the *Zeitschrift für Psychologie* covers the ground for German readers.

Among the books that have appeared during the year we may mention Wundt's "Grundriss der Psychologie," a compendium of his lectures on general psychology; this has already been translated into English by Dr. Judd of Wesleyan University. Prof. Jodl's "Lehrbuch der Psychologie," a book of some 760 pages, is the most notable German work on general psychology of the year. In England there have appeared a large two-volume work on "Analytic Psychology" by Mr. G. F. Stout, the Editor of *Mind*, and the "Elements of Psychology" by the late G. Croom Robertson, edited from his lecture notes by Mr. Rhys

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forced upon a woman. She has no right to transmit a nature and a character that is subservient, inefficient, undeveloped", etc. This opinion is in large part based on the supposition that the mother's physical influence in heredity is greater than the father's and that the mother's mental condition is more certainly transmitted to the child than is that of the fathers. Now there is not the slightest scientific ground for such an opinion. It is a common opinion among the breeders of domesticated animals that the father transmits the mental, and the mother the physical qualities. Whether this be generally so or not, it is well known that in mankind the father's mental characters are at least as often transmitted as are those of the mother.

But one of the results of recent investigation into heredity is the establishment of the general principle that characteristics which are of a temporary or one-sexed character are not as easily transmitted as was formerly supposed. The germ-cells are so protected that long periods of time and long-continued influences are required to produce appreciable changes of character in a family or a race. This truth may spare mothers a good deal of anxiety as to the effects of their conduct during gestation, though of course unhygienic habits will produce diseased conditions in children. This, however, is disease and not character.

But the development of adaptability of character is absolutely essential to the existence of the family and of society. Nature has placed in the hands of the man the strength of body and mind to combat and use her forces to a degree far exceeding that with which she has endowed woman. It has, therefore, come about that woman has found her most congenial as well as useful field in the family. Moreover the perfect development of mankind requires that the altruistic traits shall be fostered as well as the egoistic. The natural functions of woman develop the former, while those of the man develop the latter. Fortunately it has results that both qualities have been inherited by each sex, but with the predominance in each of that which is most necessary in their respective fields. The course of human evolution has not tended to unify the sexes, but to diversify them. This is a well-known result of scientific research.

The paper of Mrs. Gardener has a distinct tendency to discourage the beneficent and altruistic role which woman fills in civilized society, and to strike at the root of that admirable adaptiveness of many women, which is a guarantee of domestic harmony. And this is of more importance to human civilization and development than any theory as to woman's so-called individual independence. Like all

other theories of individualism and anarchism it tends of the destruction of coöperative life, which is in the family the basis of civilization.

This well understood position does not mean the neglect by woman of her intellectual life. In this she should be, as in her moral nature, as much a guardian of human progress as the man. But in the moral nature she should guard the altruistic, as man is forced to develop the egoistic; otherwise man is likely to develop egoism in excess, and degenerate rather than advance in the scale of spiritual being.

E. D. Cope.

ANTHROPOLOGY.[1]

Mr. Wilson's investigation of the Swastika Cross.—Two lines intersecting at right angles, to form a cross, make a *Swastika* (as the Buddists called it in Sanscrit) if you bend the ends of the four arms in the same direction. Drawn, painted, cut, woven, scratched or otherwise designed upon utensils, or objects of every day life, the interesting figure appeared first, it seems, in the bronze (possibly polished stone age) of Europe and though not found in the earlier chipped stone (Neolithic) period, was discovered later among the Etruskans, Greeks, and Troyans (at Hissarlik or Troy). It seems to have been unknown in Assyria, Babylonia, Phoenicia and Egypt, but was used in India before the Christian Era, and persists not only in the Orient but also among the Finns and Lapps, and in remote corners of Europe, while generally disused for the last thousand years in Christendom.

To establish its existence in the new world Mr. Wilson, in a handsomely illustrated volume (The Swastika by Thomas Wilson, Curator Department of Prehistoric Anthropology, United States National Museum, Washington Government printing office 1896) presents valuable evidence. His numerous illustrations show the figure carved on shells from the Fains Island and Toes mounds, Tennessee, silhouetted on the copper plates from the Hopewell tumuli in Ohio, doubtfully painted on a water jug from Poinsett County, Arkansas, and carved on a stone metate from Nicaragua and a slab of lime stone from Yucatan. The Kansas Indians drew it on their song charts as shown, we see it woven in the bead-necklaces of the Sacs, painted on a gourd rattle of the Pueblos and figured in the dry sand paintings of the Navajoes. So the lucky sign we are told ornaments the bead work of the Kickapoos

[1] This department is edited by H. C. Mercer, University of Pennsylvania.

Pottawotamies and Iowas, and we are shown it decorating the bull hide war-shields of the Pimas of Arizona and painted on the triangular female waist covers "(fig leaves)" of the Caneotires river Indians of Brazil.

The book enumerates the theories of those investigators who would derive the Swastika from the sun, from the earth, from fertility, from the meander design, from the cross, from the fire drill, from the four quarters of the world, and of those who deny the possibility of accounting for it at all. But the interesting question raised by Mr. Wilson is how did it get to America? In answer to which certain American students would probably contend that it grew here, that the outline is too simple to have required suggestion from abroad, that pre-Columbian Americans might have taken to drawing, painting scratching or stamping it on any object at any time, thus only showingthat the human an mind under given environments acts similarly.

As opposed to this conservatism Mr. Wilson declines to class the Swastika among the simple things such as the drawing of circles crescent moons or animal tracks, the wearing of beads, or, I may add, the habits of whistling, beckoning or nodding assent,[2] etc., etc.—the easy and inevitable things that all men think of spontaneously and without suggestion from abroad. He will let the cross fall into this category but not the Swastika. To twist the cross arms into a Swastika is, he holds, an inconsequent after thought, and the figure is held to be peculiar, difficult and suggestive. Always associated with luck among modern North American Indians, marked on the triangular waist cover of the Brazilian Indian woman as upon the waist of the Goddess Artemis excavated at Hissarlik, why, he asks, did it not migrate from Asia before Columbus, as had migrated the winged-globe to Mesopotamia (from Phoenicia and Egypt) the Greek fret to modern Europe (through Egypt from Greece) the Northumberland rampant lion (through Flanders from Albania) or the Austrian double headed eagle to Europe (through the Emperor Frederic II from the Turcomans and Hittites.)

If it is as old as the European bronze age it is older than and might have migrated before Buddhism (6th century B. C.). So that it would not signify, as Mr. Wilson urges that no sure memento of Buddha worship has been found with it in the United States.

[2] I do not know whether the fact that the modern Egyptians who are inveterate singers, do not whistle has been noticed, but I heard no Arab or Fellah whistle a tune or whistle as Christians do to dogs or animals, etc., during a Nile journey and a two months visit to Cairo in 1881. In 1886 I was confused by the fact that the Jews and Turks in Salonica *shook* the head horizontally (our dissent) instead of nodding it to signify assent, and to beckon a person towards them, turned the right palm downward and motioned *outward* with the fingers.

Mr. Wilson does not claim to have presented more than a probability. But as science asks for demonstration we must wait for assurance of the trans Pacific origin of the American Swastika, well pleased with the author's interesting collection of evidence bearing upon the problem of the origin of American peoples.

The curious fact of the similarity in primitive weaving apparatus common to the Old and New Worlds is brought out. Small perforated discs, generally of earthenware, found in ancient Europe, the western United States, Mexico and South America, have been identified as whorls or weights for giving momentum to the spindle stick thrust through them, when twirled by the spinner over the knee and let go, just as women in remote parts of Germany and France have continued to whirl the spindle in recent years.

Of several thousands of these whorls unearthed by Schliemann in the city layers at Troy (Hissarlik), many were marked with the Swastika and some with the cross, while, strange to say, as Mr. Wilson shows, certain whorls from Mexico and South America exhibit likewise the cross (not Swastika) design. As yet more clearly testifying to the use of the cross as a symbol in ancient America upon spindle whorls, I take pleasure in illustrating here a whorl found by me while the present paper was in preparation, among the specimens entrusted me for classification by the Historical Society of Bucks County, Pennsylvania. It was recently obtained by Mr. J. W. Detweiler, of Bethlehem, from one of the ancient graves (probably pre-Columbian), regarded as of great antiquity by the modern natives, on the Rio Cauca Valley in the Republic of Columbia. It might be held that many of the American crosses shown by Mr. Wilson are, (like the cross stamp on an iron gas-plate, S. W. corner 7th and Arch streets, Philadelphia, that hap pened to catch my eye as I stepped on it yesterday), decorative intersections of lines or patterns, rather than symbols. In this specimen the

Perforated disc of earthenware, probably a spindle whorl marked like similar whorls found at prehistoric and protohistoric sites in Europe with the cross symbol. Eight small crosses are seen between the arms of the central larger cross. From the Museum of the Historical Society of Bucks County at Doylestown, Pennsylvania. Obtained by Mr. J. W. Detweiler, from an ancient Indian grave on the Rio Cauca Valley, Republic of Columbia. Museum No. 112. Actual size.

symbolic intent of eight small crosses between the arms of the larger central cross seems clear. No reasonable skeptic could deny the emblem. Its presence testifying to pre-Christian cross symbolism from the Levant to the Andes, stamping it upon one of the remarkable coincidences in craft apparatus, common to the Old and New Hemispheres, adds keenly to the interest of the object.

Mr. Wilson has tightened the lines about a theory, (that of parallel development) which may go too far in admitting original migration from Asia, but denying tokens of it. And the book adds weight to our persuasion of the existence of many objects of ethnological import discovered and undiscovered, which mean migration and race-contact after all, and can no more be explained by the theory of human minds working alike, than scarabs in Etruria—HENRY C. MERCER.

Exploration of Captain Theobert Maler in Yucatan.—Archæologists look with keen interest upon all researches made among that remnant of the Maya Indians of Yucatan who have taken refuge in the great forest. No less important the investigation which might devote itself to other tribes still inhabiting the fastnesses of Chiapas or Tabasco since it cannot be doubted that Archæological information of value has been preserved by these descendants of the most highly developed of aboriginal American peoples. Captain Theobert Maler is at this moment on the point of setting out on an expedition to that part of Tabasco inhabited by the *Lacandones* indians among whom he will inquire particularly for the existence of glyptical signs and any remembered trace of the art of hieroglyphic writing once characteristic of their ancestors. He informs me that certain interesting ancient industries are well preserved among them as for instance the making of incense burners (of clay?) adorned with human faces and painted with vivid colors, while the art of chipping arrow-heads and blades of flint still flourishes. With great interest we would follow the details of his search for a key that might open for us the long hidden meaning of the Maya literature, though he fears that the knowlege of the ancient symbols among the *Lacandones*, is entirely lost.—H. C. MERCER.

Cave hunting in Syria.—At the entrance of several rock shelters near Liban, Syria the Abbé Charles Moulier has recently found (see La. Nature, 25th, July, 1896) a series of chipped flint blades "well representing the types regarded as Mousterian, or of Reindeer age" in France. These objects which are never associated with specimens of polished stone, are discovered bedded in a reddish hard breccia mixed with

the bones of animals. But strange to say, though the blades judged by their shape, are presumed by the finder to be (like their French duplicates) of Quarternary age, the bones represent animals still living in the country.

At two other surface sites El-Ouasahai and Santon, he finds a remarkable mixture of stone implements some chipped and others polished, together with innumerable potsherds, bits of marble, glass and mosaic and flint blades of various sizes and shapes, where from an archæological point of view it would appear that he had dug into several culture periods at once, though judged by the stratification it has as yet seemed impossible to make any distinction between epochs. A final detailed report of the work will be awaited with interest.—H. C. MERCER.

PROCEEDINGS OF SCIENTIFIC SOCIETIES.

Boston Society of Natural History.—February 3, 1897.—The following paper was read: Mr. William C. Bates, "Venezuela and Guiana, their Natural History, Scenery and People."—SAMUEL HENSHAW, *Secretary.*

New York Academy of Sciences, Biological Section.—January 11, 1897.—Dr. G. S. Huntington read a paper entitled "A Contribution to the Myology of *Lemur bruneus.*"

The paper deals with some of the ventral trunk muscles and the appendicular muscles of the forelimb and pectoral girdle. A comparison of the structure of these muscles with the corresponding parts in other members of the suborder shows *L. bruneus* to possess marked primate characters in the arrangement of the pectoral girdle muscles and the muscles of the proximal segment of the anterior limb. This is especially evident in the lateral recession of the pectorales; the compound character of the ectopectoral insertion, the junctions of a pectoralis abdominalis with the typical entopectoral insertion, and the presence of an axillary muscular arch, derived from the tendons of the Latissimus dorsi and connected with the deep plane of insertion of the ectopectoral tendon.

The presence of a third or inferior portion of the coraco-brachialis is noted in addition to the upper and middle portion usually present in the Lemuroidia.

The ventral trunk muscles present a distinct carnivore type in their arrangement, instanced by the high thoracic extension of the rectus abdominalis, the occurrence of a well-developed supra costalis, the union of levator scapulæ and serratus magnus, the thoracic extension of the scalenus group—interlocking both with the serratus magnus and obliquus externus.

The aponeurosis of the obliquus externus presents a well-developed division of the internal pillar of the external abdominal ring, dovetailing with the one from the opposite side and forming the triangular ligament of the same.

Mr. H. E. Crampton, Jr., reported some of his "Observations Upon Fertilization in Gasteropods."

The observations were made upon the eggs of a species of Doris, collected last summer on the Pacific coast by Mr. Calkins, and upon a species of Bulla which deposited eggs at Woods Holl during the months of August and September. The results may best be summarized by stating that a complete confirmation was obtained of the accounts of fertilization given by Wilson and Mathews, Boveri, and Hill for sea-urchins, Meade for Chætopterus, Kostanecki and Wiejyewski for Physa, etc. The sperm nucleus is preceded by the divided centrosome; an aster, however, not being found till the union of the germ-nuclei. The first polar spindle lies at each pole a double centrosome, the second maturation spindle but one. These are of great size, however, and the one remaining in the egg finally disintegrates, the centrosome of the first cleavage spindle being derived from the sperm. The germ-nuclei do not fuse, but lie very close to one another, in contact.

Mr. N. R. Harrington gave an account of the life history of Entoconcha, a mollusc parasitic in a Holothurian. His paper was illustrated by photographs.

The following paper was read by title: N. R. Harrington and B. B. Griffin, "Notes on the Distribution, Habits and Habitat of Some Puget Sound Invertebrates."—C. L. Bristol, *Secretary.*

Torrey Botanical Club.—At the annual meeting of the Torrey Botanical Club, held Tuesday evening, January 12, 1897, six new active and two corresponding members were elected. Resolutions of sorrow were adopted regarding the death of Mr. Wm. H. Rudkin, one of the oldest members, the discoverer of the hybrid oak *Quercus Rudkinii.* Annnal reports were presented by the standing committees and officers. It was resolved to print a list of the desiderata of the herbarium of plants growing within 100 miles of the city. The Treasurer reported a cash

balance of $56.89 in the regular fund, and $514.14 in the Buchanan Fund.

The Recording Secretary, Dr. Rusby, reported an average attendance of 31 persons at the 15 meetings held during the year, 2 deaths, a net gain in active membership of 28, a present active membership of 219, corresponding membership 150, honorary membership 4, scientific papers presented 37, of which 22 had been published. Several hundred new species and a number of new genera had been communicated, and there had been a marked increase in the attention given to anatomical and cryptogamic subjects.

The Editor reported that Vol. 23 of the *Bulletin* had aggregated 548 pages and 34 full-page plates, and that two numbers of the Memoirs, aggregating 206 pages, had been issued. There was a cash balance from publications of $48.09 in addition to the balance already reported by the Treasurer.

The officers for 1897 were elected as follows: President, Addison Brown; Vice-Presidents, T. H. Allen, H. H. Rusby; Treasurer, Henry Ogden; Recording Secretary, Edward S. Burgess; Corresponding Secretary, John K. Small; Editor, N. L. Britton; Associate Editors, Emily L. Gregory, Arthur Hollick, Anna McVail, B. D. Halsted, Lucien M. Underwood; Curator, Helen M. Ingersoll; Librarian, William E. Wheelock.

The scientific program of the evening included papers by Mr. A. J. Grout and Dr. N. L. Britton.

In the first paper, "Notes on Some American *Brachythecia*," Mr. Grout compared the principles of classification employed by the two prominent bryologists, Schimper and Lindberg, and stated his reasons for preferring those of the latter to those of the former. He then exhibited and remarked upon four American species of *Brachythecium*, and expressed the opinion that they represent a genus distinct therefrom.

The paper will be published in full in the *Bulletin*.

Dr. Britton's paper was upon "*Linum Virginianum* and its Relatives." He illustrated the chief distinguishing characteristics of the species of *Linum* of the *Virginianum* group, and dwelt particularly upon the claims to specific rank of *L. Virginianum medium* Walter. —EDWARD S. BURGESS, *Secretary*.

American Philosophical Society.—February 5th.—This being one of the three meetings during the year at which special subjects are considered, the Committee on Programme selected "The Genesis

and Chemical Relations of Petroleum and Natural Gas," and invited Professor S. P. Sadtler to open the subject. Professors S. F. Peckham, of Ann Harbor, Mich., C. F. Mabery, of Cleveland, O., and F. C. Phillips, of Allegheny City, Pa., presented their views from either the geological or chemical standpoint, or both. Profs. Edw. Orton and J. P. Lesley were also invited to participate in the discussion.

Biological Club of the University of Pennsylvania.—February 1st Program.—Original communication: "Account of the Boston Meeting of the Society of American Naturalists," Profs. Macfarlane, Conklin and Cope. Demonstration: "A Fossil Micro-fungus of the Coal Measures," Dr. J. M. Macfarlane. Reviews—Psychological, Dr. Lightner Witmer.—H. C. PORTER, *Secretary.*

The Ohio State Academy of Science held its winter meeting at Columbus, December 29th and 30th. The attendance and papers read show that this society is now well past the critical period of infancy. The Presidential address, by Professor Albert A. Wright, was an argument in favor of State coöperation with the U. S. Geological Survey for the production of a topographic map of Ohio. The proposal was heartily endorsed by the academy, and a committee appointed to take steps toward carrying it out.

Prof. D. S. Kellicott gave a list of ten fresh-water sponges in Ohio, with their localities; also, additions to his list of the Odonata of the State, bringing the number up to 94.

Additions to the list of Ohio phænogams, including altogether about twenty native and nearly as many introduced species, with new stations for other rare species, were given by Edo Claassen, of Cleveland; A. D. Selby, of the Agricultural Experiment Station; W. A. Kellerman, of the State University, and E. L. Moseley, of Sandusky.

"Additions to Ohio Fungi," by F. L. Stevens, gave as new to the list eight genera, eighty-five species, ten new hosts, and thirteen new localities. Fungi new to the State list were reported also by A. D. Selby and Edo Claasen.

E. L. Moseley reported a bird new to Ohio, the murre, *Uria troile*, whose occurrence on the Great Lakes has been doubted. Two were shot at Put-in-Bay, December 19th, and on the same day two near Sandusky.

Lynds Jones gave a detailed account of a grackle-roost on the college campus at Oberlin. The old males began coming to the roost at night, May 16th, while incubation was in progress; later, the females and

young. The number during July, August and September averaged 6,000. Berries and green corn formed the bulk of the diet.

Prof. Claypole read a short paper on the Potato-rot Fungus, giving considerable evidence to show that the infection of the tubers from the parasite upon the leaves is not through the stem, but by the conidia falling to the ground and penetrating the tubers at the eyes.

"A Peculiar Case of Spore Distribution," by F. L. Stevens, cites with photographic evidence the distribution of spores of *Uncinula necator* by animal agency, probably a snail.

"An Anatomical Abnormality in the Human Hand," by E. W. Claypole, mentions a skeleton in which there were two scaphoid bones on both the right and left side.

"Os acetabuli," by Lynds Jones, describes this important secondary element of the os innominatum, which has been ignored by the majority of anatomists.

Gerard Fowke gave an account of archæological work in Pike County, and Warren K. Moorehead made remarks on a State archælogical map. Among the most interesting and important papers was one by Mr. E. E. Masterman, of New London, O., giving an account of the finding of a grooved stone axe, the material of which was profoundly oxydized at a depth of 22 feet in glacial drift or in the top of the boulder clay. The circumstances were such that every opportunity of mistake was apparently eliminated, and there seems to be no possibility of escaping the conclusion that the implement is a genuine relic of human workmanship which dates back to the later part of the ice age, when streams of water from the melting glacier deposited the sheets of gravel and clay which cover the plain of New London. Full details of the "find" have been published by Prof. E. W. Claypole in the November number of the *American Geologist*, to which the reader is referred.

Mr. Masterman exhibited also several other specimens, but none from so great a depth as the axe.

A list of Ohio Crambids was given by J. S. Stine, also a paper on "Museum Pests and Their Treatment," and one on "A Few Greenhouse Insects." E. W. Claypole presented a list of butterflies found in Summit County, and a paper on a peculiar katydid. Prof. Kellicott described a dragon-fly nymph from a thermal spring in California. Prof. F. M. Webster read a long and interesting paper on "Biological Effects of Civilization on the Insect Fauna of Ohio," and another on "The Protective Value of Action, Volitional or Otherwise, in Protective Mimicry."

Rev. H. Herzer gave a paper on "*Psaronius*," exhibiting a number of large specimens from the coal measures of Ohio.

Prof. E. W. Claypole gave an account of a stalagmitic deposit in the Carboniferous Conglomerate at Cuyahoga Falls, in which were found countless bones of a small tortoise, a few bones and teeth of the beaver, and some fragments of the skeleton of a deer.

Prof. W. G. Tight read papers on "The Preglacial Big Kanawha Drainage" and "A Preglacial Channel in Fairfield County." In a paper on "Huronite," by Prof. A. A. Wright, he proposed the use of the name "huronite diabase," as a petrographical term in tracing the distribution of boulders. "New Evidence Upon the Structure of Dinichthys," by A. A. Wright, was a resume of the evidence now existing as to whether the median element of the ventral armor of this Devonian fish consisted of a single plate only, as argued by Dr. Newberry, or of two plates, an anterior median and a posterior median, such as exist in Coccosteus, its British congener. In one species of Dinichthys indisputable evidence of *two* plates exists.

A key for identifying the land mollusca of Ohio was presented by Dr. V. Sterki.

The other papers read were: "A Simple Method of Inbedding Plant Tissues in Gelatin," E. M. Wilcox and J. W. T. Duvel; "Some Preservatives for Fresh-Water Algæ," Miss L. C. Riddle; "A Mode of Preserving Specimens for Class Use," E. W. Claypole; "Some Interesting Leaf Variations" and "Note on Cornus florida," Mrs. Kellerman; "Notes on Ustilagineæ," Aug. D. Selby; "A Hybrid Impatiens," F. L. Stevens; "Two Hydmuns," E. L. Fulmer; "Additions to the List of Exogens of Cayuhoga County," Carl Krebs; "Some Adaptations in Fungi" and "Comment on a Phase of Botanical Instruction," W. A. Kellerman; "Explorations of Norse Remains on Charles River, Mass.," Gerard Fowke; "How Do Glaciers Move?" John J. Janney: "Two Rare Fishes," Roy C. Osburn.

The academy appointed a committee to endeavor to induce the legislature to amend the game laws, and passed a resolution to be forwarded to Senator Sherman, protesting against the passage of the bill proposing to prohibit vivisection in the District of Columbia.

The officers elected for 1897 are as follows: Pres., W. A. Kellerman, Columbus; 1st Vice-Pres., Dr. C. E. Slocum, Defiance; 2d Vice-Pres., J. B. Wright, Wilmington; Sec., E. L. Moseley, Sandusky; Treas., D. S. Kellicott, Columbus. Executive Committee (elective members): L. H. McFadden, Westerville; W. M. Hill, East Liverpool.—E. L. Moseley, *Secretary*, Sandusky, Ohio.

Eleventh Annual Session of the Iowa Academy of Sciences.—The Iowa Academy in its eleventh annual session at Des Moines, Dec. 29th and 30th, 1896 enjoyed one of its most profitable sessions. The papers presented were as follows.

Prof. S. Calvin, "The State Quarry Limestone," discussed a series of limestone ledges in Johnson Co., Iowa, which are of Devonian(?) age and consist of comminuted parts of brachiopods, crinoids, etc., some of them deserving to rank as a brachiopod coquina. Its unconformability on the Cedar Valley limestone shows an erosion period not hitherto suspected in the Devonian and is evidently one of long duration. The fauna of the formation included the Devonian *Ptyctodus* and the subcarboniferous *Psephodes* among the rich fish remains and also brachiopods showing affinities to the carboniferous forms.

C. R. Keyes, "Stages of the DesMoines or Chiey coal-bearing series of the Kansas and southwest Missouri and their equivalents in Iowa," also, in conjunction with R. R. Rowley (read by title), "Vertical Range of Fossils at Louisiana."

A. G. Leonard, "Natural Gas in the Drift of Iowa" enumerates localities where natural gas occurs in the state and discusses its origin. Of the coal measures shales and the vegetable remains in the drift as possible sources the author concluded that for the Iowa localities the latter is the probable one.

J. L. Tilton, "Results of Recent Geological work in Madison Co." describes the geological formations of the county and discusses particularly the relation of preglacial to present drainage system.

G. E. Finch, "A Drift Section at Oelwein" described minutely an exposure recently brought to light in a railroad cut showing three distinct till sheets.

S. G. Beyer, "Evidence of a Sub-Aftonian Drift in Northeastern Iowa." Deduces from evidence at Oelwein, Albion and other points the extension of the Sub-Aftonian to this portion of the state.

T. H. Macbride, "The Botany of a Pre-Kansan Peat-bed" described recognizable plants occurring in the drift section exposed at Oelwein.

B. Shimek, "Observations on the Surface Deposits of Iowa" gave additional observations in support of his view presented at the last annual meeting of the Academy that the loess formation of western Iowa were of aeolian origin.

The same author in "The Flora of the Sioux Quartzite in Iowa," listed the species observed on this formation and discussed their relation to the flora of the other parts of the state, "Notes on the Aquatic Plants of Northern Iowa" also by the same author was devoted mainly to the flowering species occurring in ponds and lakes.

Bruce Fink in "Spermaphyta of the Fayette Iowa Flora" presented a list of about 700 species of plants collected for that locality.

T. Z. Fitspatrick, "Notes on the Flora of Iowa," a short list of species new to the state or but little known to its flora.

G. W. Newton, "The Mechanism for securing Cross fertilization in *Salvia lanceolata*."

L. N. Pammel, "Notes on some Introduced plants in Iowa."

Emma Sirrine, "A Study of the Leaf Anatomy of some species of the Genus *Bromus*."

Emma Pammel, "A Comparative Study of the Leaves of *Lolium*, *Festuca* and *Bromus*."

C. B. Weaver, "Anatomical Studies of the Leaves of Certain Species of the Genus *Andropogon*."

C. R. Ball, "Some Anatomical Studies of the Leaves of *Eragrostis*."

The four papers above, gave extended details of anatomy bearing particularly on the value of such characters as means of separating species or varieties.

Gilbert L. Houser, "The Uses of Formaldehyde in Animal Morphology." Advantages and disadvantages; uses in Neurological work, also in "The Nerve cells of the Shark's Brain" discussing morphological importance, features of structure, and details the results reached by use of the Golgi method.

L. S. Ross read three papers "Some Manitoba Cladocera with Description of One New Species." "A New Species of *Daphnia*, and Brief Notes on Other Cladocera of Iowa." "The Illinois Biological Station."

F. A. Sirrine, (by title) "The Probable life-history of *Crepidodera cucumeris*."

Charles Carter, of Fairfield discussed the Odonata of Iowa in some preliminary remarks and requested correspondence on the group.

E. D. Ball, "Notes on the Orthopterous Fauna of Iowa."

A. H. Conrad, "The Ophidia of Iowa" remarked on the changes in the fauna of the state and the desirability of a prompt study of the group.

Herbert Osborn, "Additions to the Hemipterous Fauna of Iowa" lists of number of species not hitherto recorded.

In Business session, among other items, resolutions were passed opposing anti-vivisection laws in the District of Columbia and a subscription was voted to the Pasteur Monument Fund.

The following officers were elected for the coming year:

W. S. Franklin, President; T. H. Macbride, Vice-President; B. Fink, 2nd. Vice-President; Herbert Osborn, Secretary and Treasurer; L. S.

Ross, J. L. Tilten and C. C. Bates to serves with officers as elective members of executive committee.—HERBERT OSBORN, *Secretary.*

Botanical Seminar of the University of Nebraska.—January 16.—At the regular monthly meeting. De Alton Saunders presented a paper upon "The Relations of the Laboulbeniaceæ to the Red Seaweeds," illustrated by blackboard sketches of their structure.

January 23.—This adjourned meeting was devoted to a Symposium upon "Systematic Mycology" led by Roscoe Pound, who spoke first upon "The Relation of Morphology to Classification" and then upon "Schrœter's Arrangement considered as a Modification of the Brefeldian Arrangement." Hs was followed by Dr. Bessey on "The Natural Arrangement of the Fungi," and F. E. Clements on "Suggestions for a Re-arrangement of the Higher Fungi."

SCIENTIFIC NEWS.

A PROTEST.—I am sure that I voice the opinions of a large number of naturalists when I protest against a tendency very strong in some localities to rename things already well named. It would even appear to an outsider that these persons must think that by this introduction of new names they were greatly advancing science. To me it seems that they must be clogs to the wheels of progress. One must needs know a double or even a triple nomenclature to read their papers intelligently, and this learning of these new names is, as Col. Lyman has expressed it, "like saw-dust swallowing, neither palatable nor nutritious."

As an example of what I mean I may cite the article on "Formal" in the January number of THE AMERICAN NATURALIST. We are told there that "the term formaldehyde is a cumbersome one" and "formal" is suggested as a substitute. Shall, therefore, every cumbersome name be discarded? Do not the constituent parts of the name mean something? Is not the name of the sea-urchin of northern New England—*Strongylocentrotus droebachiensis*—cumbersome? Must we, therefore, change it?

If we must change the names of these substances, of these things, because of their sesquipedalian names, let us take some pains with the substitutes proposed. Formal for formaldehyde is unfortunate. Formaldehyde has the formula H–CHO. By the rules of chemical nomenclature the term "formal" would mean a compound like acetal, one which would have the formula $H–CH–(OE)_2$ and hence the endeavor to get rid of a cumbersone term introduces a worse confusion. It is, to quote Waterhouse Hawkins' pun, bewildering.

—A COMPARATIVE ANATOMIST.

Again we are to use the term formal for formaldehye both for this substance itself and for its solution in water. Is this not adding to confusion? Formalin, we are told is a term which has no meaning. From the standpoint of chemical terminology this is true but from another standpoint it is not. It is an arbitrary term introduced into the language to denote a forty per cent. solution of formaldehyde in water and as such it has a distinct meaning and, on the ground of convenience, a very great value.

In the same article are other illlustrations of just this same tendency against which I protest. There are incidentally mentioned axon, alba, tela, and the like and one trained in the nomenclature of universal use has to refer to a large series of papers in order to ascertain just what is meant by all of these expressions. I can see no reason why the term notochord is not good enough for anyone; it is descriptive, and it has but a single meaning which cannot by any possibility be confused. How about its proposed substititue "axon" I have not taken the trouble to look up the reasons for substituting this term. On its face it would seem to imply something pertaining to the axis (of the body). But is the notochord really axial? As far as the vertebral centres are concerned it is, but beyond this it is not, and to just this extent it is a misnomer. So far as any higher metazoan may be said to have an axis, that axis is the alimentary tract.

These I merely instance as examples of what I protest against. The terminology of modern zoology is sufficiently overloaded already with terms and this attempt so persistently made in certain quarters to give us in addition an almost complete series of synonyms is most aggravating. I would suggest to these would be reformers that there is no little truth in Goethes' lines when he says that reality "ist alles

"Name ist Schall und Rauch.
Umnebelnd Himmelsgluth.

COMPARATIVE ANATOMIST.

Emil du Bois-Raymond.—The well known physiologist, professor of physiology at the University of Berlin, founder of the Physiological Institute, and perpetual Secretary of the Berlin Academy, died December 26th after a severe illness. Prof. du Bois Raymond was born, November 7, 1818 in Berlin, where his father, who had begun life as a match maker, had attained considerable eminence. His early education was received at the College Français in Berlin and later at the College of Neuchatel. At the age of eighteen he entered the University of Berlin and was matriculated in the Philosophical Faculty.

At first he was much interested in electricity and attended the lectures of Neander. But about 1837 he took up seriously the work in which he became so well known. After some time spent with mathematics, physics and chemistry, he began studies under J. Müller, and somewhat later became his assistant.

His being asked in 1841 by Müller to repeat the observations of Matteucci in his essay "Sur les phénomènes électriques des animaux," published at Paris a year previously, led to the historical studies that he embodied in his dessertation for the degree of D. M. (Quæ apud verteres de piscibus electricis extant argumanta"), and to the discovery of the main facts of modern electro-physiology. In 1858 he succeeded Müller as Professor of Physiology at Berlin, and in 1867 was chosen secretary of the Berlin Academy. As a result of his forethought the Berlin laboratory became the model for similar laboratories the world over, for the plans upon which the palatial building in Neu Wilhelmstrasse was erected after the Franco German war, were of his designing.

His papers are numerous, but his great work is that "On animal electricity," the first volume of which appeared in 1848 and the last only about ten years ago. In 1878 he published his "collected papers," which comprise all of his scientific work done up to that time except what had been embodied in his "Thierische Elektricitat." The historical introduction contained in the first few chapters of his "Animal Electricity," his essay on university organization (1870), that on the present and the past of physiological teaching, and on the relations of natural history to natural science (1878), that on the limits of natural knowledge (1882) are well known.

The real greatness of the man consisted, not in the theories that he put forth, but in the exactitude of his observations, the excellence of his methods, and the large number of new relations that he discovered between physical and vital phenomena. As Ludwig taught the world how to investigate the mechanics of the circulation, and as Helmholz how to determine the time-relations of physiological processes of very short duration, du Bois-Raymond not only opened a new field for investigation, but also furnished the means of working it.

Like other great teachers he founded a school, and if his pupils were not so numerous as those of some other greater teachers, they occupy very important academical positions. (See "Nature").

Prof. Francis E. Lloyd, who now holds a position in the Pacific University, Forest Grove, Oregon, has been appointed professor of biological science in the Teachers College.

The Danish Paleontologist, Henrik Julian Posselt, died July 20, 1896. He was connected with the museum in Copenhagen and was a student of Molluscs and Molluscoids.

Dr. Stuhr goes to the University of Breslau as assistant in the Anatomical Institut, in the place of Dr. H. Endres who went some time ago to the University of Halle.

Dr. N. Tschermak, of St. Petersburg, succeeds Prof. Barfurth as professor of comparative anatomy and embryology in the University of Dorpat.

Mr. Fernand Latush calls the attention of correspondents to the fact that his present address in Cadellac-sur-Garonne, Gironde, France.

Dr. Auguste Louis Brot, conchologist, died Aug. 30th, at the age of 75; for forty years, he was connected with the museum at Geneva.

Dr. V. Goldschmidt has been advanced to the position of professor extraordinarius of mineralogy in the University of Heidelberg.

J. C. Willis, formerly assistant in botany in the University of Glasgow, has gone as Director to the botanical garden in Ceylon.

Professor F. Jeffrey Bell has resigned his position as professor of comparative anatomy in Kings College, London.

T. S. Hart, of Melbourne, is appointed tutor in geology and botany in the School of Mines, Ballarat, Australia.

Dr. Theodor Margo, Professor of zoology in the University of Budupesth, died Sept. 5th, 1896, aged 80 years.

Dr. A. V. Fomin has been appointed assistant in the botanical garden of the University of Dorpat.

N. Rüdinger, professor of anatomy in the University, of Munich, died Aug. 25, aged 64 years.

Dr. N. Andrussow, of St. Petersburg, takes the chair of geology in the University of Dorpat.

Dr. Jensen was recently appointed privat-docent in physiology in the University of Halle.

Dr. R. Zander, assistant in botany in the agricultural school in Berlin, died Sept. 10.

Dr. F. Tognini is now conservator of the botanical garden of the University of Pavia.

Th. Hick, instructor in botany in Owens College, Manchester, is dead, at the age of 56.

Dr. Fritz Westhoff, privat-docent in the Akademie of Münster, died Nov, 11, 1896.

Dr. v. Dungern is now docent in bacteriology in the University of Freiberg.

Dr. Braus is now privat-docent in zoology in the University of Jena.

Maurice Chaper, Malacologist, died in Paris July 5, 1896.

L. Rudolph, botanist, of Berlin, is dead at the age of 83.